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It is not yet sufficiently realised that just as septicæmia is a sequel or complication of pyogenic infection so gas gangrene is an infrequent complication of anaerobic infection. Two related conditions must therefore be defined at the outset: infection by gas-forming anaerobes; and true gas gangrene.

INFECTION BY GAS-FORMING ANAEROBES

There is a group of spore-bearing anaerobic organisms, of which *Clostridium welchii* and *Cl. septique* are the most often met, which are commonly found in all types of lacerated wounds. The organisms or their spores are constantly present in cultivated soil and in clothing made from wool or skins. The infection is likely to be more heavy in lacerations received in the highly cultivated lands of Western Europe, and in those parts of the world where wool and skins are necessary for protection from cold, than in the deserts of North Africa, or in warm climates or seasons when cotton clothing is sufficient. The infection will also tend to be heavier when the wound is produced by direct external violence than when it is produced by internal violence, as in a compound fracture resulting from indirect force. It will also be heavier when the wound is produced by irregular missiles, such as bomb or shell fragments or broken bullets, than when the wounding agent is smooth like a bullet or a bayonet. The irregular missile will certainly carry in some clothing containing the organisms.

It is safe to assume that all recent wounds seen in England which have been caused by shell or bomb fragments are infected by gas-forming anaerobes. These organisms will grow and spread rapidly but, at first, only on dead or almost dead tissue. They produce a greyish film on the wound surface from which escapes a small amount of thin dirty exudate with an unpleasant smell, often containing small bubbles of gas. These changes in the wound surface occur very rapidly and are usually well established within twenty-four hours of the injury—that is, they appear much more rapidly than the familiar changes due to pyogenic infection. These first changes are not accompanied by gross swelling or hyperæmia of the wounded part, nor is there any characteristic general reaction.

If the wound is associated with much laceration and bruising of the surrounding tissues these rapidly change colour and become green and black, much brownish discharge appears, gas bubbles freely from the blackened sloughs, and the wound smells abominably. There is swelling of the surrounding tissues and often a little crepitation from gas under the skin. The wound is not unduly painful; the temperature and pulse-rate are moderately raised and the patient looks and feels ill. Such a wound under any or no treatment will shortly produce laudable pus from the action of the ordinary pyogenic organisms; the sloughs will separate, leaving weak, pale granulations bathed in pus, and at the end of a fortnight it will be covered by healthy granulation and well on the way to healing. In other words, the anaerobic infection has produced some interesting phenomena in the first forty-eight hours, but has not obviously interfered with the normal processes of inflammation and repair. Indeed, gas infection is an interesting but harmless feature of most lacerated wounds. It would not be worthy of special mention and study were it not that in a small minority of cases it is liable to develop the rapidly fatal and almost untreatable complication which we know as gas gangrene.

GAS GANGRENE

Gas gangrene is an *acute spreading gangrene* characterised by the production of large amounts of gas in the tissues, and by a profound toxæmia. The natural termination of the disease is death from toxæmia or from a general invasion of the body by the causal organisms. It is an infrequent complication of the infection of wounds by certain spore-bearing anaerobes of which *Cl. welchii* and *Cl. septique* are the most important. Within a time varying from six hours to four days, but usually in the second twenty-four hours after the injury, the wound becomes abnormally painful and the surrounding tissues become swollen and tense. At the same time there is a steep rise in the pulse-rate, and sometimes a rise in temperature, though this is not great as a rule and is often absent. These are prodromal signs; gangrene threatens.

If nothing is done to abort the disease the pain will continue for a variable time according to the severity and acuteness of the attack, and will often cease quite suddenly. The pulse-rate continues to rise to 140 or even 160, but is the pulse of fever and not the running pulse of shock or collapse. The patient, who is at first alert but anxious and distressed by the pain and discomfort, becomes conscious of a change for the better. He is often excited and talkative, assuring himself and everyone how much better he is; he becomes restless and thirsty, and in the later stages vomits incessantly. In contrast with his euphoria, his complexion—which in the early stages shows the flush of fever—now has a muddy pallor which obviously presages death. Mild jaundice is common in the last stages and is often seen soon after the onset of the disease. A coma of exhaustion usually precedes death.

Locally the tense and swollen limb becomes yet more tense and swollen; crepitations from gas can be felt under the skin, which becomes white and waxy. The swelling and crepitation begin to advance rapidly, traversing the thigh from knee to groin in two hours or less. They do not stop at the junction of the limb with the trunk but go on inexorably, not even ceasing with the patient's death. At first the tense white skin is obviously alive whatever may be the condition of the underlying tissues, but as time passes it too dies. The first sign is a brown discoloration from hæmolysis. This is only a warning, and skin so stained is probably viable, but when purplish discoloration appears the skin is dead. The smell or the gas escaping from the wound are only evidences of gas infection and not necessarily of serious importance. Smell and gas do not make gas gangrene, but may presage its arrival. The diagnosis is made on two main features: severe and progressive toxæmia, as shown by rapid pulse, restlessness, euphoria and vomiting; and increased swelling and tension in the wound area with evidence of gas in the tissues.

The warning that gas gangrene is imminent is given by the combination of increase of pain and tension in the wound, and a steep rise in the pulse-rate. A wounded man, once he is settled comfortably in bed, should not be conscious of severe pain. If he is in severe pain something is wrongly arranged, or some change—such as hæmorrhage—is occurring. If a patient who has been reasonably comfortable complains of pain and becomes restless, always ask yourself if he is threatened with gas gangrene, and don't rest until you have satisfied yourself on this point. There are few conditions in which a few hours may be so vital. Infection with gas-forming anaerobes is a common, almost universal feature of all war wounds; gas gangrene is an infrequent complication of such infection. Infection with gas-forming anaerobes needs no specific treatment, except that directed to the prevention of gas gangrene.

FACTORS IN THE DEVELOPMENT OF GAS GANGRENE

The wounds which develop gas gangrene are ones involving muscle, but not all muscle wounds go on to gas gangrene. Generally speaking, the larger the amount of muscle damaged the greater the danger of gas gangrene, but this is not the whole story. Big open lacerations of the thigh or buttock may severely damage a pound or more of muscle, and this great devitalised mass will show all the phenomena of infection with gas-forming anaerobes in their most obvious form. Much smell, much gas, colour changes in the muscle from brick

1. Based on a lecture delivered at the British Postgraduate Medical School in January, 1941.

red to green and black, will all be obvious, but the patient, although seriously ill from the severity of the infection and the suppuration, will not be in any danger of gas gangrene. So the disease is not due simply to infection of damaged muscle with gas-forming anaerobes; there must be some other factor.

But if a fragment of shell, penetrating the buttock through a small hole in the skin, grossly lacerates the muscles without disturbing the overlying fat and skin gas gangrene is very likely to develop; here a large mass of lacerated and gas-infected muscle is enclosed so that when swelling occurs the local tension is greatly raised. Perhaps the important cause is not the injury to muscle but the tension. The apparent liability of wounds of muscle to develop gangrene may arise from the fact that almost all severe wounds involve much muscle and that the real cause of the disease is the retention of the infected tissues under pressure. There is evidence to support this view. Infection of a large hæmothorax with gas-forming anaerobes may go on to a fulminating attack of gas gangrene, and similar infection of the retroperitoneal tissues may give rise to an inevitably fatal spreading cellulitis and gangrene. In each of these cases we have gas gangrene starting in dead or damaged tissue other than muscle. It is clear, therefore, that injury to muscle is not an essential feature of the disease. But it will not do to ascribe the disease merely to raised tension at the site of the wounds. In penetrating wounds of the brain it is a common thing to find that when the hole in the bone and the dura is enlarged gas and decomposing brain escape with such force as to show they have been retained under considerable pressure. In spite of this I have never, in my experience of many hundreds of brain wounds, seen gas gangrene follow. In fatal cases of gas gangrene beginning elsewhere and terminating in a blood infection I have seen the brain at autopsy full of gas bubbles. There is thus no inherent antagonism between brain tissue and the anaerobes, and it seems to follow that retention of the infected tissues under pressure is not by itself enough to lead to gas gangrene.

Infection by gas-forming organisms of a large mass of tissue, either grossly damaged by the missile or—as in the case of blood in a hæmothorax or in the retroperitoneal space—cut off from the defensive mechanisms of the body, is very liable to go on to gas gangrene if free drainage to the exterior is prevented. The danger scarcely exists if the amount of damaged tissue so retained, as in brain wounds, is small. Another group of cases illustrates these points dramatically—wounds in which the main vessel of a limb is divided so that the part distal to the wound is threatened with simple gangrene. In these gas gangrene is almost certain, and every hour that passes without treatment makes the disease more certain. The wound need not be large—a tiny fragment is as lethal as several ounces of metal. Here we have the large mass of ischæmic tissue retained under the intact skin.

The factors then which make for the development of gas gangrene in some wounds are: a large mass of damaged and devitalised tissue confined in such a way that the products of the infection cannot escape, and must be absorbed. This explanation does not, at first sight, cover all the cases seen. Gangrene often occurs in comparatively slight wounds of the calf and thigh muscles, in which the total amount of laceration must be small. Wounds of this type will only develop gas gangrene if the damaged tissue is muscle. Small wounds of skin or subcutaneous tissue or bone or brain are not dangerous in this regard although the infecting organisms will grow freely in them.

MUSCLE

Does the anatomy of muscle explain the appearance of gas gangrene in comparatively unimportant wounds? Muscle is an aggregation of long fragile fibres enclosed in a strong fascial sheath. The fibrous inelastic sheath closely invests the fleshy mass, is attached to the tendon or bone in which the muscle ends and often gives attachment to many of the muscle-fibres. In the limbs each group of muscles is enclosed by an outer sheath of strong fascia, and then the deep fascia of the limb forms a sheath enveloping all the muscles together. The blood supply is derived in the trunk from small branches from many sources, but in the limbs many of the muscles are supplied by one or two main branches, which have a very poor anastomosis with vessels outside the sheath.[2] Consequently any interference with the main blood-supply of a limb muscle is liable to cause a dangerous ischæmia.

When a small fragment of bomb or shell enters the calf or thigh it makes a small hole in the skin which may or may not gape, then a large hole with soft ill-defined walls in the subcutaneous fat; it then pierces the deep fascia, through a hole just large enough to admit it and no larger, and with sharp, rigid, inelastic edges; finally it pierces the muscle sheath and enters the muscle tissue. So far it has been traversing passive tissues; now it strikes an active tissue which responds to stimulation by a violent contraction. This reflex contraction pulls the damaged muscle-fibres widely apart, with the formation of a relatively large ragged cavity.

The ordinary reactionary swelling and hæmorrhage in response to the injury takes place inside the muscle sheath. Escape of the contained blood and fluid is often prevented by the shape and narrowness of the wound-track or by prolapse of torn muscle or fat into the narrow fascial opening. So that there is now a small mass of infected material enclosed in the limb. Gas-forming anaerobes become active and multiply rapidly in the walls of the ragged cavity and in the contained blood and debris; swelling of the muscle increases and gas is formed. Shortly the muscle sheath is completely filled and the cycle of strangulation with which we are familiar in so many inflammatory diseases begins to occur inside the muscle sheath. The venous return is interfered with, more swelling and œdema follow, more obstruction results, and before long what was a minor injury to the muscle has led to gross interference with the nutrition of a large part of it. Circumstances favouring the development of gas gangrene are thus produced.

TREATMENT

I have said nothing of the bacteriology and biochemical aspect of the problem partly from ignorance, but chiefly because, as I understand it, nothing has yet emerged which helps in the practical management of the disease.

The aim of treatment is to prevent the development of the disease, or, if this cannot be done, to arrest it with as little damage to the patient as is possible. The problem of gas gangrene would not arise if all wounds could be properly excised with three to six hours of infliction. A successful excision of a recent wound will ensure that the anaerobic infection is reduced to a minimum and that no considerable mass of material is left in which the organisms can prepare for an assault on the undamaged tissues. But only a minority of important wounds lend themselves to satisfactory excision. The patient may not reach the surgeon sufficiently early; his general condition may preclude operation for a good many hours, the multiplicity of his wounds may mean that the full operation would take two hours, or even more; the total number of patients needing attention may be such that only those measures which are essential can be taken for each one.

With patients in whom infection with gas-forming anaerobes is already established or presumed we must aim at rendering the infection innocuous. The first step is to enlarge the wound in such a way that there is free drainage into the deepest recesses. The skin wound should be extended by adequate incisions, preferably parallel to the long axis of the limb; these incisions should go through the superficial fat as far as the deep fascia. The wound in the deep fascia should then be enlarged in the same directions, and if necessary (and it often is) the fascia should be divided transversely also so that the tortuosities of the wound track are more clearly visible and the tension is more adequately relieved. Next, the hole in the underlying muscle sheath must be similarly enlarged, and then the walls of the wound in the muscle itself cut away freely until healthy muscle is exposed. This needs care because the fibres may retract unequally and deep pockets may be found in the walls of the wound, the openings into which must be enlarged freely. The wound track should be followed through from muscle to muscle if necessary, the same care being used, whenever a fascial layer is encountered, to make an adequate opening.

2. See Campbell, J. and Pennefather, C. M. *Lancet*, 1919, **1**, 294.

It will often not be practicable to pursue this ideal opening up to the full depths of a small wound in, say, the big muscles of the thigh ; the damage done would be incommensurate with the risk that we are trying to lessen. In these cases, however, the real danger comes from the small holes in the inextensible fascial sheaths, and these holes should be freely enlarged whenever and wherever they are encountered. We must watch out for the nerves running to the muscles and never divide vessels going into a muscle. Division of such a vessel may provide just that mass of dead or damaged tissue we are trying to get rid of. From the limited angle of infection with gas-forming anaerobes and gas gangrene it matters little what is done with the wound once it has been adequately opened up. Probably some form of loose pack is best.

Treatment on these lines will be sufficient for wounds of muscle seen before any evidence that gas gangrene is threatened. If the case cannot be dealt with until pain and swelling and rise in pulse-rate have occurred, the same approach should be made, but on more generous lines, until the damaged muscle is reached. There will be much more smell, gas bubbles will be seen, and the muscle round the wound track will be firm and friable, of a brick-red colour, and will not contract on stimulation. All this muscle must be freely cut away until healthy bleeding and contracting muscle is reached. It may be necessary to resect a whole muscle belly before one can be satisfied that safety has been ensured. If faced with the next stage of actively spreading gangrene, do not rush at once to amputate. Ask yourself if it is possible to get rid of the gangrenous mass by a local excision of a muscle, or a group of muscles. It may be possible to save a limb by sacrificing the soleus and gastrocnemii, or the hamstrings. In doubtful cases there is neither danger nor objection to large exploratory incisions into the affected area. It is important to remember that the upper limit of the gas is not related closely to the upper limit of the gangrene but often precedes it by many inches ; conversely, the gangrene of muscle always extends to a higher level than that of the skin. If amputation must be done it is usually possible and advisable to fashion skin flaps, which should be long to allow for excessive retraction. If on dividing the muscles it is found that one or more is already gangrenous at the site of section, do not change your plan—finish the amputation and then split your stump widely and excise the dead muscle. Never sew the flaps together, just pack the wound with gauze and bandage it firmly.

As far as I am aware, there is as yet no serious evidence that anti-gas-gangrene serum and sulphanilamide have any effect. Much that has been ascribed to them seems to be based on ignorance of the normal course of these infections and of the effects of surgical treatment. As to X rays, I would hesitate to use an empirical method in a disease so dangerous and rapid ; I will wait until good evidence of its efficacy is produced.

ELIMINATION OF STREPTOCOCCI FROM SUPERFICIAL WOUNDS
BY SULPHANILAMIDE POWDER

BY LEONARD COLEBROOK, M.B. Lond.
COLONEL, R.A.M.C. ; CONSULTANT BACTERIOLOGIST ; AND
A. E. FRANCIS, M.D. Lond., M.R.C.P.
MAJOR, R.A.M.C.

THE introduction of sulphamido-chrysoidine (red prontosil) by Domagk in 1935, and of *p*-amino-benzene-sulphonamide (sulphanilamide) by M. and Mme Tréfouel, Nitti and Bovet (1935) attracted world-wide attention, because these compounds seemed to bring us for the first time within sight of an "internal antiseptic," that is, one which would control bacterial infection by way of the blood-stream. In the earliest clinical trials in this country it was observed that the hæmolytic streptococci were not killed off completely in the local focus, for they could often be cultivated from the lochial discharges for two or three weeks after a patient's recovery from puerperal fever (Colebrook and Kenny 1936). Similarly they were found to persist in the tonsils after treatment of tonsillitis or scarlet fever. Further, Domagk and other German authors laid stress on the fact that red prontosil had little or no direct bactericidal or bacteriostatic effect on hæmolytic streptococci.

These considerations made it appear unlikely that the local application of the new drugs to infected wounds would have much effect. Later, however, when it became clear that red prontosil was converted into sulphanilamide in the body (Tréfouel et al, 1935, Fuller 1937), and that this latter substance had a considerable bactericidal and bacteriostatic effect on hæmolytic streptococci in vitro, even when no cellular elements were present (Colebrook, Buttle and O'Meara 1936, Hoare, 1938, Fuller, Colebrook and Maxted 1940), the possibility that the local application of the drug might be beneficial began to attract attention. Purdie and Fry (1937) were the first in this country, so far as we are aware, to report the powdering of a wound infected with hæmolytic streptococci. In order to obtain the maximal therapeutic effect these authors gave sulphanilamide by mouth as well as locally, and there was therefore some doubt as to how much of the striking clinical result was due to the local application. During the last few months the opportunity has arisen to investigate the effect of local applications of sulphanilamide (and sulphathiazole) on a number of superficial wounds in the maxillo-facial unit of Park Prewett Hospital (E.M.S.) at Basingstoke.

In the investigation 35 patients with 62 wounds were followed through for several weeks. All of them were infected with hæmolytic streptococci, 55 wounds yielding cultures of Lancefield's group A, 9 of group G, and 1 of group C. In 1 case the original infection was a streptococcus of Lancefield's group D ; this case subsequently became infected with group-A streptococci. In 3 cases an original infection with streptococci of group A was replaced, after treatment with sulphanilamide, by hæmolytic streptococci of group D. The great majority (32 patients) received sulphanilamide locally only, and none by mouth. Swabs were taken from the wounds usually 24 hours after the last application of sulphanilamide powder. In order to exclude the possibility that the absence of streptococci in cultures was due to transfer of a trace of the drug on the swab, the latter was sometimes inoculated into 10 c.cm. of blood broth from which subcultures were made on blood agar. They never gave a positive result where the direct plate culture was negative. In other cases negative swabs were planted on blood agar containing 1/500,000 gentian violet (Garrod 1933), in order to ascertain that a few streptococci were not overgrown by an abundant growth of staphylococci.

METHOD OF APPLICATION

It was found essential, before beginning treatment, to remove sloughs, coagulated exudate, dried pus and remains of tan. This was effected by saline baths. In some cases eusol dressings were found to be of assistance. Wounds were usually dressed once daily. After removal of the old dressings, which were sprayed with sterile saline to facilitate removal and minimise trauma in cases not receiving saline baths, and after completion of the wound toilet, finely powdered sulphanilamide was insufflated on the wound, and over grafts if these were present, until the appearance resembled a hoar-frost. No advantage was found from heavier powdering. Tulle gras was then applied, and gauze, well moistened with saline, covered this. In order to retain moisture the gauze was covered in turn by a considerably larger sheet of jaconet or oiled silk, and a firm bandage applied. We would emphasise the importance of this retention of moisture and of applying the powder to the wound surface before a thin film of dried exudate has formed on it—often a matter of only two or three minutes exposure. In several instances when attention was not paid to these details streptococci persisted longer than usual on the wounds.

When the next dressing was performed 24 hours later the sulphanilamide was found to be completely dissolved on all raw areas, though it was still clearly visible on the surface of grafts, and on the surrounding skin. Solution

was not always complete in a few cases in which the wounds were examined after 4 or 6 hours.

In some cases sulphathiazole was used. It was found to be almost completely undissolved after 24 hours, but most of it had disappeared if left for 48 hours. It appears to have been less effective than sulphanilamide in these circumstances against *Streptococcus pyogenes*, but has freed a small number of wounds of *Pseudomonas pyocyanea* and *Proteus*. Sulphanilamide has not been successful with the latter organisms.

RESULTS

Group-A infections.—In 21 cases with 33 wounds infected with *Streptococcus pyogenes* the local application of sulphanilamide powder resulted in the permanent disappearance of the microbes. In 3 cases with 10 sulphanilamide was also given by mouth, and in these the streptococci also disappeared. In 4 cases a recrudescence of infection followed grafting operations which were carried out within ten days of obtaining the first negative swab from the wounds concerned. Owing to the procedure then followed the wounds were not dressed for several days, and powdering could not be continued. The streptococci were of the same type before and after grafting in each case. One other case should probably be classed under this heading, but the type of streptococcus originally present is not known. The infection reappeared in one case four days after the discontinuance of powdering. Another patient who returned to hospital a month after discharge with a small ulcer on a grafted area was also found to be harbouring hæmolytic streptococci in this ulcer. In all these cases the infection responded to a further course of treatment, with the exception of the last, who had to leave hospital before treatment could be started, for urgent domestic reasons.

Group-C infections.—In one case a wound was freed of group-C streptococci and healed uneventfully.

Group-G infections.—In one case these streptococci disappeared with local treatment only, in another with local and simultaneous oral therapy, and in a third case, unsuitable for local therapy (compound fracture of the mandible), with oral sulphanilamide only.

Group-D infections.—In 4 cases this streptococcus has been found to resist local treatment with sulphanilamide.

ILLUSTRATIVE CASE-RECORDS

The signs +, ++ and +++ indicate the presence and abundance of hæmolytic streptococci in culture, the sign − indicates a negative culture; Sm or Stz 1/d indicate the local application of sulphanilamide or sulphathiazole powder respectively once daily.

CASE 1.—Excision of rhinophyma, Sept. 20, 1940. Two unhealed ulcers on nose.

Oct. 8 +++ Group A.	Oct. 21 −
,, 18 ++ Sm 1/d started.	,, 24 Discharged healed.
,, 20 −	

CASE 2.—Petrol burns of face and hands, Sept. 26, 1940. Unhealed area on left forearm.

Oct. 2 + Group A, type 11.	Oct. 14 Few.
,, 7 + Sm 1/d started.	,, 19 −
,, 10 Few.	,, 21 − Discharged healed.

CASE 3.—Petrol burns, May 16, 1940. Unhealed donor areas on thigh, 23·2 sq. cm.

Oct. 4 ++ Group A, type 12.	Oct. 14 −
,, 8 +++ Sm 1/d started.	,, 16 No swab. Sm stopped.
,, 9 Few.	,, 19 − Area 10·25 sq. cm.
,, 10 −	,, 21 −
,, 11 −	

CASE 4.—Petrol burns, June 20, 1940. Unhealed area on left forearm, 14·6 sq. cm.

Oct. 10 + Group A, type 11.	Oct. 24 −
,, 11 + Sm 1/d started.	,, 28 −
,, 14 −	,, 30 Successful graft.
,, 18 − Area 10·8 sq. cm.	Nov. 5 Nearly healed.

CASE 5.—Burns of hands and face. Unhealed area over interphalangeal joint of right ring finger, 2 sq. cm.

Sept. 30 + Group A, type 12.	Oct. 8 −
Oct. 4 + Sm 1/d started.	,, 9 −
,, 5 Few.	,, 13 −
,, 6 −	,, 18 Successful graft.
,, 7 −	

CASE 6.—Burns from incendiary bomb, May 21, 1940. Approximately symmetrical involvement of the hands. Left hand only treated.

Left hand	*Right hand*
Oct. 13 +++	+++
,, 16 Proteus	Proteus.
,, 17 Proteus	
Sm 1/d	Proteus.
Oct. 19 − Sm 1/d	Proteus and +
,, 21 − ,,	++, no proteus.

CASE 7.—Donor area on chest, flap operation, Sept. 16, 1940. Area 60 sq. cm.

Oct. 17 Few Group A, type 12.	Oct. 25 +
,, 18 Few Stz 1/d.	,, 27 −
,, 21 Few ,,	,, 28 −
,, 23 Few Sm 1/d started.	Nov. 4 − Area 37·5 sq. cm.

It will be noted in this case that sulphathiazole failed to clear the infection in five days, but that sulphanilamide succeeded in four days.

All cases which for any reason received a sulphonamide compound by mouth, such as a prophylactic course after operation, are excluded from these examples.

FAILURES

The first case quoted under this heading illustrates the fact that a wound cannot be successfully freed of infection by *Strep. pyogenes* if there is much exudate which cannot be removed from the surface.

CASE 8.—Loss of scalp, injury by airscrew, Jan. 23, 1940. A pedicle graft had been formed, and behind this was a deep fissure, in which a sero-purulent exudate collected. It was also difficult to insufflate sulphanilamide adequately behind this flap.

Oct. 14 Few Group A, type 25.	Oct. 26 Pedicle sutured in position.
,, 16 ++	,, 28 − Sm 1/d.
,, 16 No swab Sm 1/d.	,, 30 − ,,
,, 18 ++ ,,	Nov. 4 − ,,
,, 20 + ,,	,, 8 Healed.
,, 22 ++ ,,	
,, 25 ++ ,,	

CASE 9.—The failure in this case has not been adequately explained. The streptococcus has been examined in vitro and shown to be relatively insusceptible to sulphanilamide.

Fell in fire, April 7, 1938. Burn of scalp.

Sept. 21 +	Oct. 30 −
Oct. 1 + Group A, type 12.	Nov. 5 Grafted unsuccessfully; 12 g. Sm given by mouth in next 5 days.
,, 4 No swab Sm 1/d.	
,, 6 − ,,	
,, 7 − ,,	
,, 8 − ,,	,, 11 −
,, 9 − ,,	,, 15 Grafted successfully; swab +++ a few hours before operation; 25 g. Sm given by mouth in next 6 days.
,, 10 − Sm stopped; 151 sq. cm.	
,, 13 −	
,, 16 Grafted unsuccessfully; 9 g. Sm given by mouth in next 4 days.	,, 19 ++
	,, 21 ++
,, 17 − Sm 1/2d.	,, 25 −
,, 20 − ,,	,, 28 −
,, 23 + Sm 1/d.	Dec. 2 − Almost healed.
,, 28 Few Group A, type 12.	

Since no *Strep. pyogenes* were found in the throats of the patient or the nursing staff, and since no other patient in the same ward was harbouring a streptococcus of identical type, it is thought that the organism, which was resistant to treatment, remained in the depths of the granulation tissue. The final result, after two failures, is satisfactory.

DISCUSSION

In view of the well-recognised tendency for hæmolytic streptococci to persist in open wounds, it seems highly probable that their prompt disappearance from so many wounds in this series after the beginning of local treatment with sulphanilamide was in fact due to the drug and not to coincidence.

Dusting with sulphanilamide certainly had no adverse effect on the healing process; indeed, in the majority healing seemed to be much accelerated when the streptococci disappeared. In a few cases the actual area was traced on sterile Cellophane at intervals and measurements of the area were made by planimeter.* One such case showed a reduction from 17·6 to 10·7 sq. cm. in 5 days, and another from 5·2 to 2·0 sq. cm. in 8 days. Further observations of this kind are required. If they confirm the impression of rapid healing we have obtained hitherto, the question will arise as to whether the acceleration was entirely attributable to the elimination of the streptococci, or was perhaps due in part to some stimulant action of sulphanilamide.

The results obtained on superficial wounds with little exudate do not justify the assumption that sulphanilamide introduced into a freely suppurating deep wound

* For these measurements we are indebted to Mr. C. W. Burton of Basingstoke.

will also get rid of streptococci, or even inhibit their free growth. Fleming (1940) and Macleod (1940) have shown that pus usually contains some factor (? products of proteolytic digestion) which neutralises the bactericidal and bacteriostatic effects of sulphanilamide on streptococci in vitro. It may be that this factor, operating in a suppurating wound, will prevent the elimination of streptococci. On the other hand it may sometimes happen that a strong solution of the drug in such a wound will overcome the inhibitory effect of the pus ; that can only be determined by observation of a number of cases.

It is also to be expected that even on superficial wounds with little exudate sulphanilamide will sometimes fail to eliminate hæmolytic streptococci, and that these may reappear in the wound. This may be due in some cases to a relative insensitiveness of the streptococcus to the drug. (Such relative insensitiveness has been demonstrated in vitro with a few group-A strains ; see Hoare 1939). In other cases it may be due to reinfection from a deep focus to which the sulphanilamide does not gain access. Reinfection may also sometimes be due to the persistence of streptococci on the skin around the powdered wound, owing to lack of fluid in which the sulphanilamide can dissolve. We are indebted to Prof. A. A. Miles for calling our attention to this possibility. He has himself observed such persistence on the skin after disappearance of hæmolytic streptococci from the actual wound. We have confirmed this observation in a few instances. It is to be noted here that we have found hæmolytic streptococci of Lancefield's group D to be entirely resistant to sulphanilamide when applied to wounds infected with these microbes, just as they are resistant in the urinary tract.

The ability to change the bacterial flora of superficial wounds at will—or at least to eliminate certain undesirable types—is likely to prove of considerable value. Our experience suggests that the removal of hæmolytic streptococci will greatly accelerate healing ; it will also enable plastic and orthopædic operations to be undertaken with more assurance of success than in the past. If, in the future, we can eliminate *Ps. pyocyanea* and *B. proteus* as well, the scope and value of skin-grafting operations will also be greatly increased. It may be that one of the potent antibacterial compounds produced by moulds or certain bacteria—e.g., penicillin or "gramicidin"—will achieve this result.

In the early treatment of burns, too, we may hope for valuable help, since streptococcus infections have in the past been responsible for most of the tissue destruction (and not infrequently for generalised infection), as well as for slow healing and the distressing contractures associated with it. A recent experience with a group of 6 severe burns (which will be reported elsewhere) suggests that by local chemotherapy these infections can often be terminated in a few days and rapid healing secured.

Yet another result may be expected—perhaps the most important in the long run. The elimination of hæmolytic streptococci from many open wounds must inevitably diminish the chances of cross-infection in surgical wards. There can be little doubt that the dissemination of organisms occurs chiefly in four ways—by dust, by faulty surgical technique, by the social contacts of patients in the wards, and by droplets from persons with an infected throat or nose. The first three of these channels of infection will be effectively blocked in proportion as we can eliminate streptococci from our open wounds. Our experience at Park Prewett Hospital affords a striking illustration of how the "streptococcus concentration" in surgical wards may be affected by these means. When this investigation began, no less than 73% of all the open wounds in the maxillo-facial unit were infected with hæmolytic streptococci. Six weeks later the proportion had fallen to 20% infected with all groups of hæmolytic streptococci, or 12% infected with group-A streptococci. Although certain other measures—e.g., segregation of cases, prophylactic administration of sulphanilamide before operation, and a stricter ward ritual—had been put into operation during this period, it is probable that the use of sulphanilamide powder was chiefly responsible for the change.

SUMMARY

The effect of applying sulphanilamide powder to 62 superficial wounds infected with hæmolytic streptococci has been investigated. In 3 patients with 10 wounds the drug was given by mouth at the same time. Hæmolytic streptococci usually disappeared from the wounds within 3 or 4 days and did not reappear. Infections with hæmolytic group-D proved resistant to local treatment.

Neither sulphanilamide nor sulphathiazole had consistent effects on the staphylococci, *B. proteus* or *Ps. pyocyanea* which were also present in many of the wounds.

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A HUNDRED CASES OF BREECH PRESENTATION

BY

ALAN GAIRDNER, M.B. OXFD, F.R.C.S. — MARGARET HADLEY JACKSON, M.B. LOND., D.R.C.O.G.

L. N. JACKSON, M.C., D.M. OXFD

IDEALLY, breech delivery ought to be extremely rare. In practice, attempts at version, particularly in primigravidæ, often fail, and choice has then to be made between vaginal delivery by the breech or delivery by cæsarean section. It seemed to us worth while to collect a number of cases of breech presentation treated in hospital and private practice and to consider the results of various methods. Under infant mortality we have included all stillbirths and deaths within the first few hours, whether attributable to labour or not.

HOSPITAL PRACTICE

From the records of the Royal Devon and Exeter Hospital one of us (A. G.) collected 64 cases of breech presentation. Of these, 28 occurred among primigravidæ and 19 among multiparæ ; in the remaining 17 cases no note of parity was made. Successful versions were noted in 11 cases and these are not further considered. Version was noted as unsuccessful in 9 cases (some of which were subsequently delivered vaginally and some by cæsarean section). Maternal mortality in this series was nil ; the infant mortality 10. Cæsarean section was performed in 26 cases, of which 14 were primigravidæ and 7 multiparæ ; in the remaining 5 no note was made. Among these there was only 1 neonatal death, a monstrosity with hydrocephalus and spina bifida which survived an hour. Among the 27 infants delivered vaginally as breech or footling there were 8 deaths. Unfortunately many of the records are incomplete, but the following brief notes are given for what they are worth :—

CASE 1.—Multipara. Aged 23. Breech. Hydramnios. Spontaneous delivery of very small baby which survived an hour only.

CASE 2.—Primipara. Aged 32. Breech with extended legs ; three unsuccessful attempts at version. Surgical induction. No notes of delivery.

CASE 3.—Multipara. 2. Aged 34. Breech with extended arms and head. Alleged contracted pelvis.

CASE 4.—Primipara. Aged 29. Breech with flexed legs. Failed version. No notes of delivery.

CASE 5.—Primipara. Aged 29. Breech with prolapsed cord.

CASE 6.—Multipara 1. Aged 26. (First baby stillborn; ? cause). Breech with extended legs. Admitted to hospital after being in labour 24 hours. Legs and arms brought down.

CASE 7.—Parity unknown. Aged 28. Breech with extended legs. In labour 12 hours. Legs and arms brought down. Difficult delivery.

CASE 8.—Primipara. Aged 19. Breech. Vaginal delivery. No notes of delivery.

PRIVATE PRACTICE

From the records of our private practice we (M. and L. N. J.) collected 36 cases of breech presentation. Of these 24 occurred in primigravidæ and 11 in multiparæ; in the remaining case no note was made. None was treated by cæsarean section. Version was unsuccessfully attempted in 2 cases. Of the remainder, some were emergency calls for help from midwives or neighbouring practitioners, some were missed by one or other of us at antenatal examination so that version was not attempted, and some were deliberately left. Maternal mortality in this series was nil; the infant mortality 9. The cases where the baby died were as follows:—

CASE 1.—Primipara. Aged 26. Nurse's call for prolonged labour. L.S.A. Slow delivery. Delay with aftercoming head which was finally delivered by forceps. Male child weighing 8–9 lb. Subsequent successful pregnancy.

CASE 2.—Primipara. Aged 21. Nurse's call. Born before arrival of either nurse or doctor. Small male child. Unmarried mother who concealed her pregnancy. Not known if ever subsequently pregnant.

CASE 3.—Primipara. Aged 25. Nurse's call. L.S.A. Resistant soft parts; ? contracted pelvis. Extended arms and legs brought down. Attempt to deliver head by forceps unsuccessful. Finally delivered by jaw and shoulder traction and fundal pressure. Long labour (40 hours). Not known if ever subsequently pregnant.

CASE 4.—Primipara. Aged 24. Nurse's call. R.S.P. Extended arms and legs brought down. Delay with head. Large male child. Probably "helped" too soon. Subsequent successful pregnancy.

CASE 5.—Primipara. Aged 36. Called in by another practitioner. Protracted labour. Legs brought down with difficulty. One arm brought down but difficulty with head and extended right arm. Fracture of right clavicle. Long, thin male child born moribund. Breathed 3 or 4 times only. Not known if patient subsequently pregnant.

CASE 6.—Multipara 1. Aged 34. R.S.P. when first seen but rotated to L.S.A. Footling. Contracted pelvis (diagonal conjugate 3 in.). Delay with head. Large female child stillborn. Subsequent pregnancy and cæsarean sterilisation.

CASE 7.—Primipara. Aged 24. Called in by another practitioner. Contracted pelvis. Arms brought down with difficulty. Head delivered by jaw and shoulder traction. Stillborn female child. Subsequent successful pregnancy.

CASE 8.—Primipara. Aged 22. Called in by another practitioner. Shoulder presentation turned to breech. Leg brought down. Prolapsed cord. Arm pushed up and second leg brought down. Some delay with head. Finally delivered by jaw and shoulder traction. Lean male stillborn child. Subsequent successful pregnancy.

CASE 9.—Multipara 1. Aged 27. Born before doctor's arrival. Nurse failed to deliver head. Large female child stillborn.

COMMENTARY

It would be idle to attempt to draw conclusions from a mere 100 cases, but certain points of interest emerge. First, it may be noted that among these quite unselected cases there was no maternal mortality. Secondly, cæsarean section undoubtedly gave the best immediate results; in 26 cases so treated there was only one fœtal death and that, a monstrosity, was a merciful release. There can be no question that this simple and dramatic operation, attended with little immediate risk to mother or child, is a valuable weapon in the treatment of breech presentation; it is always at hand in hospital practice though less accessible to general practitioners, especially in country districts. The third point is that breech delivery per vaginam greatly increases the risk to the child; the figures were: In hospital, 27 cases, 8 infant deaths (30%); in private, 36 cases, 9 infant deaths (25%). So far as can be judged from the case-records there is no reason to suppose that the difficulties attending delivery differed appreciably in the two series. Altogether, of 63 children born vaginally breech first, 18 died.

Breech delivery, then, is a hazardous proceeding, and it should be less common than it is. Careful antenatal examination, supplemented where necessary by radiology, should reveal the presence of breech presentations so that version can be attempted. If version fails, cæsarean section becomes the treatment of choice, especially in primiparæ or in cases where some degree of pelvic contraction is diagnosed. It may be noted, however, that the risk of stillbirth is probably comparatively slight when vaginal delivery is carried out on a multipara with a good obstetric history by a skilled and patient accoucheur.

It would be interesting to know to what extent, if any, cæsarean section or difficult vaginal delivery (with a fair risk of a stillborn child at the end of it) acts as a psychological deterrent to further pregnancy. We are not, of course, in a position to answer this question, but at least 2 of our patients treated by cæsarean section had previously been delivered by this method, 1 of them twice. Of the 36 women delivered vaginally in private practice 10 have had subsequent successful pregnancies, 15 have not risked it again, and of 11 we have no record. Of the 9 mothers of stillborns, 6 have since had one or more children, 1 has not yet become pregnant again so far as we know and 2 are untraced. This suggests that stillbirth is not a deterrent but rather a stimulus to try again, whereas difficult labour resulting in a live child may tend to persuade the mother to rest on her laurels.

SUMMARY AND CONCLUSIONS

Of 100 consecutive cases of breech presentation in hospital and private practice, 11 were treated successfully by version and delivered as vertices; 26 were delivered by cæsarean section and 63 by the vagina.

There was no maternal mortality but the total of stillbirths and neonatal deaths was 19, only 1 being among the infants delivered by cæsarean section.

With increasing antenatal care breech delivery should be less common than it is. If breech presentation is diagnosed version should be attempted. If version fails cæsarean section is the treatment of choice, especially in primiparæ or where some degree of pelvic contraction is diagnosed.

Breech vaginal delivery is less risky to the child in multiparæ than in primiparæ.

Breech presentation with the baby born dead is not apparently a deterrent, either psychological or physical, to future successful pregnancy.

SULPHATHIAZOLE IN TREATMENT OF STAPHYLOCOCCAL INFECTIONS

By GEORGE MELTON, M.D.Lond., M.R.C.P.

SENIOR RESIDENT PHYSICIAN AT LEWISHAM HOSPITAL, LONDON COUNTY COUNCIL

THERE is ample experimental evidence of the effective bacteriostatic action of sulphathiazole and sulphamethylthiazole on staphylococci (Barlow and Homburger 1939, Herrel and Brown 1939, Long 1940, Macdonald 1940, Fleming 1940), but clinical data have consisted mainly of reports demonstrating their value in urinary infections (e.g. Pool and Cook 1940). Records of their action in the more severe types of staphylococcal infection, particularly in those associated with septicæmia, have mostly been confined to very small groups of cases.

Herrel and Brown, employing sulphamethylthiazole, obtained a cure in a case of staphylococcal septicæmia and a favourable response in 2 cases of staphylococcal cellulitis. Keliher (1940), using the same drug, cured a patient with staphylococcal septicæmia. Gsell (1940) reported 2 cases of staphylococcal septicæmia unsuccessfully treated with sulphathiazole. Paterson and Walker (1940) were able to cure a baby with staphylococcal septicæmia with the same drug. Dietel (1940) succeeded in curing a baby with staphylococcal meningitis. Carrol (1940) and Stirling (1940) each reported cures in 2 cases of staphylococcal septicæmia. Spink (1940) in an interim report referred to satisfactory results with

sulphathiazole in 15 cases of staphylococcal septicæmia, only 1 patient dying; no clinical details of any of his cases were given. Butler (1940) reported 5 cases of severe staphylococcal infection treated with sulphathiazole, with 4 deaths. McCrea (1940) cured 2 cases of staphylococcal septicæmia with the drug. In a previous paper (Melton 1940) I reported 11 cases of staphylococcal infection, 2 with positive blood-cultures, all of whom recovered.

In this paper I am reporting the results of sulphathiazole treatment in 50 cases of staphylococcal infection, including the 11 cases already described.* Most of these infections were of a severe type.

ACUTE OSTEOMYELITIS WITH SEPTICÆMIA

There were 5 patients in this group and 2 of them died.

CASE 1.*—Girl, aged 11 years. Osteomyelitis of ilium. Admitted April 4, 1940, on 5th day of disease. Very ill. Blood-culture grew *Staphylococcus aureus*. Plaster immobilisation. From 5th to 10th day sulphathiazole 6 g. given intravenously plus 38 g. by mouth. Maximum concentration of free sulphathiazole in blood 5·8 mg. per 100 c.cm. Blood-culture remained positive and pyrexia high. On 11th day surgical drainage of subperiosteal abscess of ileum. On 20th day open drainage of suppurative arthritis of hip. Pyrexia still high after operations. Later course of sulphathiazole discontinued because of increased pyrexia due to drug fever. Staphylococcal antitoxin (20,000 units) and blood-transfusion given on 27th day resulted in temporary improvement. On 39th day blood-culture sterile. From 40th to 43rd day a total of 48 g. of sulphapyridine was given and this was followed by slight reduction of pyrexia, but the child was not finally apyrexial until 5 weeks later. Radiography then showed extensive osteomyelitis of ilium. Ankylosis of hip on discharge.

Here the drug produced no obvious effect, but the patient recovered.

CASE 2.—Girl, aged 16 years. Osteomyelitis of tibia. Admitted June 25, 1940, on 3rd day of disease. Very ill. On 4th day surgical drainage of subperiosteal abscess. No improvement. Blood-culture taken on 6th day grew *Staph. aureus*. From 10th to 18th day 8 g. of sulphathiazole given intravenously plus 92 g. by mouth. No effect on blood-culture or general condition. Between 19th and 21st day staphylococcal antitoxin (100,000 units intravenously and intramuscularly) and blood-transfusion given with temporary improvement. On 34th day blood-culture positive. On 37th day patient died. Autopsy showed bacterial endocarditis with multiple abscesses.

In this case the drug did not affect the disease.

CASE 3.—Girl, aged 8 years. Osteomyelitis of pubic bone. Admitted Aug. 23, 1940, on 5th day of disease. Profoundly toxic with metastatic inflammation in lungs and right radius. Blood-culture grew *Staph. aureus*. Leg immobilised in Thomas splint. Sulphathiazole (65 g.) given by continuous intravenous drip for 6 days. Maximum concentration of free sulphathiazole † in blood 14·7 mg. per 100 c.cm. Striking clinical improvement, with sterile blood-culture and apyrexia, after 5 days. On 12th day recrudescence of fever with pericarditis. On 18th day surgical drainage of abscess of forearm. On 25th day death from cardiac failure. Autopsy showed purulent pericarditis; large deep-seated abscess arising from pubic bone.

This patient improved greatly with the drug; her death was probably the result of failure to drain abscesses.

CASE 4.—Boy, aged 12 years. Osteomyelitis of upper humerus. Admitted July 20, 1940, on 4th day of disease. Very ill. Blood-culture grew *Staph. aureus*. Plaster immobilisation. From 4th to 8th day sulphathiazole, 10 g., given intravenously, plus 32 g. by mouth. Concentration of free sulphathiazole in blood 5·9 mg. per 100 c.cm. Definite but temporary clinical improvement with fall in temperature, but blood-culture remained positive (6th day). On 6th and 7th day staphylococcal antitoxin (38,000 units intravenously and intramuscularly) given without definite effect. On 8th day drainage of subperiosteal abscess. On 13th day blood-culture positive. On 15th day drainage of small intramedullary abscess by drilling and saucerisation. From 16th to 19th day a further 36 g. of sulphathiazole given by mouth with reduction of pyrexia, but patient not finally apyrexial until end of 7th week. Blood-culture sterile on 28th day. Between 6th and 10th day metastatic foci of inflammation, which subsided without suppuration, in leg, foot and arm, as well as dry pleurisy. Radiographs after 7 weeks showed extensive osteomyelitis of upper half of humerus with sequestra.

Here there was reduction of toxæmia after the drug, the patient ultimately recovering.

CASE 5.—Girl, aged 10 months. Osteomyelitis of eleventh dorsal vertebra with local abscess, confirmed radiologically. Admitted Aug. 2, 1940, on 14th day of disease. On 22nd day surgical drainage of abscess, pus showing *Staph. aureus*. Between 23rd and 26th day sulphathiazole (15 g.) given by mouth. Improved, but pyrexia did not settle completely. On 35th day right-sided pneumonia only slightly and temporarily improved by sulphapyridine (12 g.) for 3 days. Soon became very ill. From 40th to 45th day further 4·5 g. of sulphathiazole given by continuous intravenous drip followed by 10 g. by mouth. Rapid improvement with quick fall in high temperature; lung condition and sinus of back were clearing up satisfactorily after a few days.

This baby showed considerable improvement after the drug. Clinically it was a case of septicæmia, although blood-culture was not done.

ACUTE OSTEOMYELITIS WITH STERILE BLOOD-CULTURE

In this group 7 cases were treated without a death. *Staph. aureus* was found in pus from abscesses associated with diseased bone in 6 cases.

CASE 6.—Osteomyelitis of lower radius and ulna. Infection followed open reduction for fracture. Exacerbation of fever plus rigor resulted from manipulation of fragments. Sulphathiazole (26 g. in 4 days) followed by rapid fall in temperature within 36 hours, the local infection recovering slowly with sequestra formation.

CASE 7.—Osteomyelitis of lower humerus; 5 days illness. Sulphathiazole (48 g. in 9 days). No fall in temperature. Subsequent surgical drainage of subperiosteal abscess followed by rapid apyrexia. Radiography 3 weeks later showed no bone disease.

CASE 8.—Osteomyelitis of upper humerus; 3 weeks pyrexia followed by surgical drainage of intramedullary abscess. From day after operation, sulphathiazole (80 g.) given in a week. Apyrexial in a few days.

CASE 9.—Osteomyelitis of lower femur. On 4th day after onset drainage of intramedullary abscess by saucerisation. Sulphathiazole begun next day and 74 g. given in a week. Apyrexial after 4 days.

CASE 10.—Osteomyelitis of acetabulum with local abscess, following chronic osteomyelitis of tibia with sinus. No improvement after sulphathiazole (22 g. in 2 days). Rapidly apyrexial after drainage of abscess.

CASE 11.—Osteomyelitis of upper femur; 2 days' history with severe toxæmia. Blood-culture grew *Staph. albus* (coagulase-negative; probably contamination). Immobilised in plaster. Sulphathiazole given by mouth (16 g. in 2 days) without improvement, followed by 6 g. intravenously in 24 hours. Free sulphathiazole in blood 2 hours after 1 g. intravenously 5·7 mg. per 100 c.cm. Rapid fall in temperature. Blood-culture while on drug sterile. Surgical exploration at beginning of intravenous therapy showed no pus in medulla. Radiography after 3 weeks showed no definite bone disease.

CASE 12.—Osteomyelitis of spine (dorsal 9 and 10) with local abscess. Sulphathiazole (105 g. in 6 days) given in 6th week after onset, resulted in 4 days apyrexia followed by drug fever and rash. Fever subsided rapidly when drug discontinued. Plaster bed when patient already apyrexial.

In 5 of these cases the drug was followed by clinical improvement, and in 2 it was without effect.

CHRONIC OSTEOMYELITIS

CASE 13.—Brodie's abscess lower femur. Surgical drainage of abscess. After 4 days postoperative pyrexia sulphathiazole (49 g. in 4 days) was followed by rapid fall in temperature.

CASE 14.—Osteomyelitis of lumbar vertebra with continued pyrexia and discharging sinuses 10 weeks after surgical drainage of abscesses over spine. Blood-culture sterile. At end of this period 96 g. of sulphathiazole given in 10 days. Permanently apyrexial 10 days after discontinuing drug.

* Cases 1, 6, 7, 11, 13, 15, 20, 21, 23 have been described in *Proc. R. Soc. Med.* 1940, **33**, 681.

† Sulphathiazole estimations were carried out by Marshall's method.

CASE 15.—Osteomyelitis of upper femur. Surgical drainage of subperiosteal and metastatic abscesses of thigh followed by many weeks pyrexia and pathological fracture of femur. Sulphathiazole begun on day after immobilising fracture in Thomas splint and 40 g. given in 5 days. Became apyrexial for 10 days (first time for many weeks). Relapsed subsequently.

CASE 16.—Osteomyelitis of cuboid with discharging sinuses and mild pyrexia, not affected by sulphathiazole (46 g. in 1 week).

CASE 17.—Osteomyelitis of tibia with sinuses. Sulphathiazole (45 g. in 3 days) given after failure of sulphapyridine to reduce fever. Followed by increase in pyrexia and congestion of sclera (toxic manifestations of sulphathiazole). On discontinuing drug became rapidly apyrexial.

There was definite improvement in 3 cases out of 5 in this group.

CARBUNCLES

Of 22 cases of carbuncle treated with sulphathiazole *Staph. aureus* was grown on blood-culture in 5. Magnesium or sodium sulphate was applied locally in all cases. The results, with some illustrative cases, are as follows:—

There were 5 cases of carbuncle in the danger zone—the upper lip and nose, with 2 deaths, both in patients who were moribund before treatment began.

CASES 18 and 19 both had positive blood-culture (*Staph. aureus*) and both died with cavernous-sinus thrombosis, present before therapy began.

CASES 20 and 21.—In both of these the carbuncles subsided without sloughing, case 20 being apyrexial in 5 days and case 21 in 3 days.

Of 4 cases of carbuncle on the lower lip, 1 had a positive blood-culture but all recovered.

CASE 23.—Aged 71 with septicæmia. Blood-culture grew *Staph. pyogenes*. Blood-urea 96 mg. per 100 c.cm. Sulphathiazole (3 g. intravenously plus 80 g. by mouth) given in 13 days; became apyrexial after 48 hours with sterile blood-culture after 11 days. Maximum concentration of free sulphathiazole in blood 13·2 mg. per 100 c.cm. Developed small empyema with *Staph. pyogenes* in pus, which cleared up after single aspiration. Blood-urea normal on discharge.

Of 13 cases of carbuncle on the scalp, neck or back, 3 had positive blood-cultures and there was 1 death.

CASE 24.—Carbuncle of back and septicæmia. Pneumonia and heart failure. Blood-culture grew *Staph. aureus*. Sulphathiazole given (12 g. intravenously and 86 g. orally in 7 days); temporary fall of temperature. Staphylococcal antitoxin (42,000 units intravenously and intramuscularly over 4 days) produced further improvement. Not apyrexial until 5 weeks; blood-culture then sterile. Sterile pleural effusion aspirated once.

CASE 25.—Aged 79, with carbuncle of neck. Blood-culture grew *Staph. aureus*. Sulphathiazole (102 g. by mouth in a week). Apyrexial after 4 days. Sterile blood-culture after 6 days.

CASE 26, aged 79, with carbuncle of scalp and multiple subcutaneous abscesses, moribund before treatment began and died after 16 hours. Of 4 carbuncles in diabetics all recovered satisfactorily.

MISCELLANEOUS CASES

A group of 11 cases, 2 with positive blood-cultures.

CASE 40.—Staphylococcal pyæmia resulting from cervical abscess after an insect bite. Blood-cultures grew *Staph. aureus* throughout treatment. Local cellulitis improved after incision and drainage. Soon very ill with pneumonia and meningitic symptoms. Failure with sulphapyridine (24 g.); sulphathiazole (12 g. intravenously plus 66 g. by mouth in 6 days) together with staphylococcal antitoxin (120,000 units intravenously and intramuscularly over 4 days). Free sulphathiazole in blood (3 hours after 2 g.) was 2·9 mg. per 100 c.cm. Did not improve and died a week later. Autopsy: bacterial endocarditis with multiple pyæmic abscesses.

CASE 41.—Staphylococcal pyæmia and suppurative arthritis of knee following infected graze. Blood-cultures grew *Staph. aureus* throughout treatment. Pneumonia and multiple subcutaneous abscesses. Sulphapyridine (28 g. in 3 days) given without effect. From 11th to 13th day of disease 50 g. of sulphathiazole given by continuous intravenous drip, but patient died after 4 days. Free sulphathiazole in blood 11·2 mg. per 100 c.cm.

Both these cases had advanced septicæmia with pyæmic abscesses before sulphathiazole therapy was begun.

CASE 42.—Perinephric abscess following furunculosis. Sterile blood-culture. Pyrexia for a month in hospital. Sulphathiazole (6 g. intravenously plus 54 g. by mouth in 5 days), followed by striking improvement, patient becoming permanently apyrexial and mass disappearing from loin in a few days.

CASE 43.—Staphylococcal pelvic abscess and cellulitis following septic abortion. Blood-culture negative. Very ill; pyrexia for a month before abscess began to discharge per vaginam. Discharge ceased after 2 days, but pyrexia remained high and pelvic mass large. Sulphathiazole then given (2 g. intravenously plus 42 g. by mouth in 4 days); striking improvement. Permanent apyrexia after 6 days when mass was subsiding satisfactorily.

CASE 44.—Large alveolar abscess pointing in submaxillary region was incised, but ceased to drain and pyrexia remained high. After sulphathiazole (18 g. by continuous intravenous drip plus 24 g. by mouth in 3 days) temperature fell rapidly in 12 hours and swelling subsided, with slight discharge only, in 48 hours. Blood-culture sterile. Pus contained *Staph. aureus*.

CASE 45.—Breast abscess rapidly subsided after single aspiration, sulphathiazole (36 g. in 3 days) being given immediately after aspiration. Pus contained *Staph. aureus*.

CASE 46.—Whitlow of finger following abrasion. Pus contained *Staph. aureus*. Sulphathiazole given (36 g. in 3 days); Whitlow incised next day; no pus found. Inflammation subsided after a few days.

CASE 47.—Baby aged 3 weeks with pneumonia; staphylococcal abscesses of thigh and wrist, both incised. Sulphathiazole (3 g. by mouth followed by 3 g. intravenously in 2 days) was without effect and the baby died after 2 days.

CASE 48.—Staphylococcal peritonitis in baby 8 days old; was operated on and then given sulphathiazole (3 g. in 3 days). No improvement; death.

CASE 49.—Staphylococcal pyopneumothorax complicating phthisis. Sulphathiazole given before drainage without benefit.

CASE 50.—Alveolar abscess of cheek. Unaffected by sulphathiazole, but cleared up rapidly after drainage.

DISCUSSION

In this series 11 patients had positive blood-cultures, present on more than one occasion in all of them; no blood-cultures were done on cases 5 and 47 although clinically they had septicæmia. Of these 13 patients, 7 died. In only 1 of the fatal cases (case 3) and 2 of the non-fatal cases (23 and 25) was the blood-culture made sterile during treatment with sulphathiazole. Antitoxin was given simultaneously with sulphathiazole in 1 case, and after a course of the drug in 3 others, without apparent effect. In only 1 case (24) was antitoxin successful after sulphathiazole had produced only temporary improvement.

In 8 cases of osteomyelitis, pyrexia was reduced while sulphathiazole was being given, but surgical drainage had already been carried out in 6 of them. Cases 7 and 10, which showed no improvement on the drug, rapidly responded when surgically drained. In cases 16 and 17, which had already been operated on before sulphathiazole administration, the pyrexia did not settle when the drug was given; indeed, in case 17 drug fever developed rapidly.

All cases of carbuncle with sterile blood-culture, except case 25, cleared up satisfactorily, the pyrexial period varying between 3 and 7 days from the time of starting the drug.

In the miscellaneous group 5 cases cleared up rapidly as soon as sulphathiazole was started. Probably in all of them the actual amount of suppuration was small, the condition present being mainly cellulitis. The 2 cases in which the drug was tried initially without effect responded readily to surgical drainage.

In many cases the drug appeared to have no dramatic effect on the local disease. In osteomyelitis the condition progressed to suppuration, and in cases 1 and 4 extensive areas of bone were involved and sequestra were seen radiographically. Cases 7 and 11 appeared to make a complete recovery without radiological evidence of bone disease, but in these the focus in the bone may have been small. Most carbuncles appear to have run the usual course, though they did not extend, as a rule, once the patient had begun taking the drug, and 2 of the facial ones subsided without obvious sloughs.

The dosage employed varied considerably. At first it was the practice to administer 1 g. intravenously for three to six doses, followed by 1–2 g. by mouth 4-hourly. Subsequently for severe cases in adults the dose was increased to 3–4 g. 4-hourly. In septicæmia it has latterly been my custom to give the drug by continuous intravenous drip, the daily dose being 20–25 g. for adults, 10–12 g. for children and 3 g. for infants. The sodium salt was dissolved in half-strength normal saline made isotonic with glucose, and the drip feed regulated so that enough solution was run in to raise the sulphathiazole concentration in the blood to 15 mg. per 100 c.cm. In practice this has been difficult to achieve. The duration of sulphathiazole treatment has varied from 2 to 16 days, most of the courses lasting from 5 to 7 days. The difficulty of maintaining a sufficiently high concentration of the drug in the blood is due to its rapid excretion. When the drug is given by mouth it is rapidly absorbed. Reinhold (1940) noticed that after a single dose of 3 g., the highest blood-concentration in the majority of cases was reached after 2 hours, and that after 4–6 hours the level was still above 4 mg. per 100 c.cm. With continued oral administration of 1 g. 4-hourly, concentrations of free sulphathiazole in the blood ranged from 1·2 to 19 mg. per 100 c.cm., averaging 5·45 mg. Comparable figures were obtained by Gaisford and Whitelaw (1940). In the present series, free sulphathiazole varied from 1·6 to 8·7 mg. per 100 c.cm. (average 4·6 mg.) after 1 g. 4-hourly, from 2·2 to 13·2 mg. per 100 c.cm. (average 6 mg.) after 2 g. doses, and from 3 to 9·3 mg. per 100 c.cm. (average 6·5 mg.) after 3 g. doses.

Long (1940) comments on the fact that after the first 24 hours of treatment concentrations of sulphathiazole in the blood are often much lower than would be expected from experience with similar doses of sulphapyridine, and that it is sometimes difficult to maintain an adequate concentration despite increases in dosage. The necessity for giving copious fluids to prevent deposition of crystals of sulphathiazole in the renal tubules may help to lower the blood-concentration by promoting excretion. In the elderly patients in whom renal function was impaired high blood levels were more readily reached—e.g., case 23 with 13·2 mg. per 100 c.cm. on 2 g. doses. This fact has been observed in connexion with the other sulphonamides. Since some degree of renal impairment is present in many old people their dosage should be adjusted by estimations of the levels in the blood. It is worthy of note that, in the septicæmic group, blood-cultures became sterile in cases 3 and 23 with concentrations of 13–15 mg. per 100 c.cm., but remained positive in cases 1 and 4 with concentration of 5–6 mg., despite the fact that the former two patients were more seriously ill.

Sulphathiazole is reported to be less likely to cause vomiting than sulphapyridine and our experience supports this. Vomiting severe enough to interfere with the administration of the drug occurred in only 1 patient; 4 patients vomited occasionally after the tablets; and 2 vomited after intravenous administration, one of these also developing a transient urticarial eruption after each injection. Drug rashes of the characteristic "erythema-nodosum" type were seen in 5 cases, usually associated with drug fever. One of the patients developed severe conjunctival congestion with irritation of the eyes; similar symptoms were noted by Long in some of his cases.

No evidence of renal damage other than transient albuminuria was observed, and even this could not always be attributed to the drug. Case 23 with a high blood-urea before treatment was not adversely affected by sulphathiazole and the blood-urea became normal. In case 25 the blood-urea did rise from 34 to 56 mg. per 100 c.cm. while the drug was being taken, but quickly returned to normal when it was stopped. Long found it necessary in some of his cases to discontinue the drug for hæmaturia‡ and anuria, but neither appeared in this series. Daily measurement and testing of the urine are important, however.

Moderate leucopenia below 6000 cells was seen in 10 cases, the lowest count being 4500 in 2 cases. The count soon became normal again when the drug was discontinued. In case 3 the count rose from 5500 to 11,500 while the patient was on sulphathiazole, and this rise corresponded to considerable clinical improvement. When leucopenia develops it is necessary to consider stopping the drug; in very ill patients it would be inadvisable to do so unless the leucopenia became pronounced.

‡ One of my ex-patients (not in this series) developed hæmaturia with extreme oliguria; this subsided when the drug was discontinued and 10% glucose-saline was given intravenously.

CONCLUSIONS

The evidence goes to show that sulphathiazole is a therapeutic agent of value in staphylococcal infections. Its action in staphylococcal septicæmia, however, has so far proved to be limited. Early diagnosis is clearly essential to successful therapy with sulphathiazole, for failure and death occurred only in the advanced cases. Fleming (1940) has shown that the action of the sulphonamides on suppurative inflammatory foci is inhibited by the presence of peptones in the pus. Thus abscesses—whether local or metastatic—will prevent successful therapy unless they are accessible to surgical drainage. Possibly large doses of sulphathiazole (controlled by repeated blood estimations) will give more satisfactory results in septicæmia, particularly in the early stages of acute osteomyelitis before suppuration has taken place. Fleming has also shown that the growth of staphylococci can be inhibited by a dilution of 1 in 60,000 sulphathiazole. Such a level would probably be inadequate in the severe human infections, and the findings in this series support the view that a blood concentration of 15 mg. per 100 c.cm. is necessary for therapeutic success. Staphylococcal antitoxin may enhance the action of the drug in the septicæmic cases.

The best results were obtained in the milder cases, and although many of these would have recovered without sulphathiazole there is no doubt that in some of them it reduced toxæmia and hastened recovery. As Butler has noted, sulphathiazole helps to reduce the toxæmia and fever which may persist after surgical drainage of abscesses or removal of the foci of infection.

Sulphathiazole is less toxic than sulphapyridine in similar doses and experimentally has been found to be more potent against staphylococci; but it is more difficult to maintain high blood-concentrations of sulphathiazole than of sulphapyridine. The decision on which is the more effective clinically must await further research.

SUMMARY

A series of 50 cases of staphylococcal infection, mostly of severe type, have been treated with sulphathiazole.

In staphylococcal septicæmia the drug was of value when given early and in adequate doses, and rapid improvement which could be attributed to the drug occurred in 5 out of 13 cases. In acute osteomyelitis it did not lessen the need for surgical drainage or check the progress of suppuration, but it helped to reduce toxæmia. Many of the carbuncles ceased to extend when the drug was begun and the pyrexial period appeared to be shortened, but there were 2 deaths out of 5 cases of carbuncle on the upper lip or nose, both in patients with cavernous-sinus thrombosis present before treatment was begun. The drug was also found of value after surgical drainage had been instituted, in clearing up the toxæmia and accelerating the subsidence of the local lesion.

It was found difficult to maintain an adequate concentration of sulphathiazole in the blood except in elderly patients because of rapid excretion, and in septicæmic cases the drug is best given as the sodium salt in isotonic solution by intravenous drip. A concentration of 15 mg. per 100 c.cm. in the blood should be attained.

Vomiting is less common than with sulphapyridine, and the only other toxic effects seen were skin eruptions, conjunctival congestion and moderate leucopenia.

I wish to thank Dr. W. Allen Daley, medical officer of health for the London County Council, for permission to treat the above cases, and the medical superintendents of the various L.C.C. hospitals at which this research was carried out. The sulphathiazole used in the clinical trials was supplied by Pharmaceutical Specialties (May and Baker) Ltd.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

AT a meeting of the Section of Therapeutics and Pharmacology on Feb. 11, with Sir WILLIAM WILLCOX, the president in the chair, a discussion on

Chemotherapy and Wound Infection

was opened by Colonel LEONARD COLEBROOK. He said that the struggle against bacterial infection during the last fifty years had taken three roads: active and passive immunisation, including surgical drainage; internal antisepsis; and external antiseptics. The first reports on red prontosil did not suggest that it would be of great value as an external antiseptic, but later developments showed that it was reduced in the body to sulphanilamide, which had a considerable effect on bacteria. It is extremely diffusible, getting quickly into all the tissues, the cerebrospinal fluid and the vitreous and aqueous humours. It has a very low affinity for the tissues and serum proteins, and so does not lose potency as the older antiseptics do; 90% or more is excreted in the urine. It is innocuous for fibroblasts and leucocytes in high concentration, and is readily absorbed from wounds. All these properties, with its powerful action on the streptococcus, make it probable that this drug has real value as an external antiseptic; but this cannot yet be regarded as quite certain. Every wound produced by violence is really a honeycomb of spaces filled with serous fluid which is a good culture medium for certain pathogens—called "serophytes" by Sir Almroth Wright. The surgeon cannot obliterate all these dead spaces, and until recently the medium in them could not be rendered uncongenial to organisms. Solid sulphanilamide introduced into the wound will produce a nearly saturated solution for some hours; up to a strength of 1 : 400 it does not harm leucocytes, though it may prove to do so in higher concentrations. Hæmolytic streptococci will be killed completely by it, without leucocytic action. Tests of its action on staphylococci and gas-gangrene bacilli are still wanting. Aerial bombardment makes it necessary in this war to have a "pansement d'attente," to hold up sepsis until the surgeon can get to work. Experiments have shown that the sulphanilamide group offer much hope in this direction; by applying them early the surgeon can hope to prevent many cases of gas gangrene, to prolong the safe period for débridement, to make delayed primary suture possible on many less severe wounds, to reduce the sepsis rate in compound fractures, to get healing in plaster without suppuration, and to do much better with burns. Almost all severe, deep burns now go septic, and so do many of the less extensive ones. The best hope of avoiding infection lies in learning how to use one of the sulphanilamide group or one of the newer mysterious related substances. Some pastes are now ready for clinical trial in burns. For deep burns an occlusive dressing to avert loss of plasma protein may be indicated. For streptococcal infections of the skin, sulphanilamide has been used locally and internally with good effect, but it has not been much used as a superficial application only. Recent tests suggest that it will be successful in this way. This kind of treatment will doubtless lend itself to much abuse, and workers must be careful to check their clinical impressions by all available means.

Mr. EMLYN LEWIS described methods of treatment in wounds and burns; unfortunately in most wound cases the drug had also been given by the mouth to get the maximum effect. The powder is worked over the wound with the finger, he said, to cover the surface, without regard to the recommended dose of 15 g. The wound is then sutured, or packed with plain or Vaseline gauze. Dressings do not need inspection until the fifth day or later. Wounds usually look impressively healthy; even if the discharge contains organisms they do not seem to affect the course of the case. Sometimes at this stage the wound is obliterated in its depth by catgut stitches and the powder reapplied. Two cases of gas gangrene were given M. & B. 693 by mouth and Streptocide locally, and recovered, although they had not had ideal initial surgical treatment. A third case, a through-and-through wound of the left thigh, was found to have much debris in the tissues and gas gangrene at operation twelve hours later. After wide excision and irrigation with peroxide, streptocide powder was applied liberally and M. & B. 693 given by the mouth. The wound healed cleanly. Streptocide powder had been used locally for burns of the second and third degree, especially on the face, hands and forearms. It was covered with Tulle Gras. Results were most encouraging; one girl was able to discontinue dressings on the third day, another on the twelfth day. In one case only were toxic symptoms seen after external application.

Prof. ALEXANDER FLEMING described experiments on the relative potency of variants of sulphanilamide. Sulphanilamide itself is not, he said, strong enough to deal with pneumococci or staphylococci; sulphapyridine is stronger and can cope with pneumococci; and sulphathiazole is stronger still and so is effective with staphylococci. It is a question of strength rather than of specificity. One important point is to test the concentration of the drug in the blood periodically; this is too often forgotten. What matters is not the amount of drug given but the amount absorbed. No drug which destroys leucocytes more readily than bacteria is useful; no pre-sulphanilamide drug passes this test. There are certain limitations in local sulphanilamide therapy. Many bacteria and bacterial extracts, some peptones and some chemicals inhibit the action of sulphanilamides; pus fluid may have this effect, so if there is much pus in the wound these drugs may be useless. Penicillin, made by the mould penicillium, may surpass the sulphanilamides. It is troublesome to make and does not keep very well, and so was not used in peacetime. Recently, workers in Oxford have isolated a solid impure penicillin which has a remarkable effect on infections both clinically and in the laboratory. Weight for weight it is four times as potent as sulphathiazole and so about a hundred times as potent as sulphanilamide. The active principle, if it could be isolated, would be more potent still. It is not inhibited by the factors which inhibit the sulphanilamides. Similar substances have been made from other moulds and organisms and all act in enormous dilutions. The action of these drugs seems to be bacteriostatic rather than bactericidal—stopping the growth of the bacteria so that the body cells and fluids will kill them. The addition of vaccine treatment to M. & B. 693 might turn the scale between life and death. A small dose of vaccine or the injection of hypertonic salt might be tried in those cases where streptococci do not disappear as they should. The combination of immunotherapy and chemotherapy is a good one.

Mr. RAINSFORD MOWLEM read a paper on sulphanilamide in skin grafting which he described as a series of impressions. He had tried to subject his practice to as severe a test as possible and so far had had only one apparent failure. Most of his patients were bombed civilians with multiple injuries needing skin grafts—burns and extensive lacerations. They are, he said, usually heavily infected on admission to the unit, though often there are no clinical manifestations of the infection; it nevertheless prevents surgical intervention and causes a high percentage of infected fingers among the nurses. In the past the effort to get a clean granulated area for grafting depended mainly on the bacteriostatic powers of the body. No antiseptic could be expected to penetrate

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to the depths of the exuberant spongy granulation tissue. Efforts were therefore made to reduce the tissue to a flat area, less inviting to bacterial growth, by pressure bandages of tulle gras over which saline was applied. Ten-minute dressings of eusol or spirit were sometimes applied for two hours, and ultra-violet light through paraffin was tried. In those days only 16% of the grafts took properly and the percentage of failures was in the forties. The introduction of the sulphonamides altered everything. Now ordinary agents are used to get rid of sloughs and produce "social cleanliness" in the wound; if sulphonamide is used from the first the sloughs may take longer to separate. Then sulphonamide powder is gently massaged into the granulations with a spatula, which seems to be a little more efficient than insufflation, and a dressing of tulle gras and saline is applied. The powder is put on daily. Before, at and after operation the drugs are given by mouth. The granulations are excised and the powder massaged into the serum in the wound. Over the whole of this area the skin graft is applied, and pressure dressings put on and left for seven days. The number of cases is now over 40 and (apart from the one failure who received no sulphanilamide by mouth) there has been no cellulitis or infection and at least 75% of the grafts have taken. The sulphanilamide beneath the graft does not prejudice the take, even though it may be $\frac{1}{32}$ in. thick. The blood sulphonamide rises to about 3 or 4 mg. per c.cm. and there has been no intoxication. All this is extremely encouraging in enabling the surgeon to apply the finest of all dressings—the patient's own skin—before fibrosis and contractures appear.

Dr. FRANK HAWKING drew attention to the possible use of sulphonamide compounds in preventing gas gangrene. Experimental wounds were made in guinea-pigs and infected with 10,000 lethal doses of *Cl. welchii* or *Cl. septique*. Insertion of sulphonamide compounds at the same time as the infection saved up to 75% of the animals. Sulphathiazole was the most effective compound; sulphapyridine was moderately effective; sulphanilamide was good against *Cl. welchii* but had no action against *Cl. septique*. Since sulphathiazole is expensive, a mixture of equal parts of sulphanilamide and sulphathiazole can be used; in experimental wounds this was almost effective as pure sulphathiazole. None of the compounds had much action against *Cl. œdematiens*. In clinical practice, the sulphonamide compound should be reinforced by the prophylactic injection of antitoxin. When treatment was delayed for 2 hours the results were much less good; when it was delayed 6 hours all the animals died. Therefore treatment should be applied as early as possible. Oral treatment was less efficacious than local treatment. A number of casualties have now been treated with sulphanilamide or sulphathiazole and have done very well. The blood concentration is always low; usually less than 1 mg. per 100 c.cm. In the guineapig wounds, sulphanilamide produces a high concentration (about 1000 mg. per 100 c.cm.) but it is all gone within 24 hours; sulphapyridine persists for 7–10 days but the concentration is only 40 mg. per 100 c.cm.; sulphathiazole persists for 4–5 days and the concentration is about 100 mg. per 100 c.cm. Sulphanilamide travels quickly from one end of a wound to the oth r, sulphathiazole fairly quickly, but sulphapyridine travels slowly, and the concentration at the far end is never high. Experiments were made on the diffusion of these compounds through the abdominal wall of the rat from within outwards, the wall being 2–3 mm. thick. If the tissue is dead sulphanilamide passes through fairly well and produces a fairly high concentration (26 mg. per 100 c.cm.) on the outside, but it requires 24 hours to do so; if the tissue is alive, however, with an active circulation, the concentration on the outside is never greater than in the body as a whole. Thus, if a sulphonamide compound is placed in the cavity of a wound, it will pass down into the crevices, and it will slowly diffuse into pieces of dead tissue. But the concentration which it produces in adjacent living tissue will be no higher than that in the body as a whole. In order to reach this living tissue the local application should be supplemented by oral administration. Finally Dr. Hawking referred to previous statements that pus would inhibit the bacteriostatic action exerted by sulphanilamide on bacteria in vitro. He treated several wounds containing thick pus by the insertion of sulphathiazole and found that the pus became sterile.

Dr. C. A. GREEN said that there were few reports on the effect of body reactions on therapy. He described work with *Streptococcus hæmolyticus* in rabbits and Prontosil Soluble. In the first experiment, the effect of therapy on the response to streptolysin O in the form of culture filtrates was studied in two rabbits. There was no indication that prontosil had any effect. In a second experiment the effect of prontosil therapy on the anti-streptolysin O response in experimental infection by hæmolytic streptococci was studied in four rabbits. Despite prontosil therapy the usual reduction in the latent interval before the appearance of the response was noted, and a higher titre was reached than in the original course. This combined result was considered definite evidence of the absence of any interference with production of antistreptolysin O as a consequence of the exhibition of prontosil. The results indicated little of any interference with production of antistreptolysin O in experimental animals as a result of the simultaneous injection of prontosil. These observations might throw some light on the disappointing results of prontosil in the treatment of acute rheumatism.

Major A. E. FRANCIS described the results of local sulphanilamide treatment in forty-seven patients with 77 wounds infected with hæmolytic streptococci. In twenty cases with 31 wounds infected with group-A hæmolytic streptococci the organisms disappeared entirely with local therapy only. A further three cases with 8 wounds received oral as well as local treatment; one case (compound fracture of the mandible) received oral treatment only. In eleven other cases, with originally 22 infected wounds, 15 wounds became reinfected, or resisted treatment. Of these, two cases had streptococci which were resistant to sulphanilamide in vitro, four cases became reinfected while on leave, one case was found to have an undrained pocket of pus, while in three cases the streptococci reappeared after operations. Two cases with group-C streptococci had responded satisfactorily but five cases infected with group D had all resisted treatment, three of them actually developing the infection while under sulphanilamide therapy. Three group-G infections had responded well. Much exudate prevented the action of sulphanilamide. The intelligent coöperation of the staff was essential. The drug must not be applied over a dried film of exudate without being moistened with saline. Sometimes eusol had been put on top of sulphanilamide; the resulting compound was inactive. Bacteria sometimes could be recovered from the surrounding skin after they had disappeared from the wound. The skin should therefore be treated with an antiseptic, such as Dettol cream. The skin sometimes became rather macerated from the saline packs, but recovered if these were left off for a day.

Dr. K. WALLERSTEINER pointed out the difficulties in estimating the efficiency of these drugs, and described the tests in use with the new Bayer compounds now becoming available. One new compound with two sulphanilamide radicles had proved to have great affinity for fibroblasts and to be very efficient. A derivative of trypan blue with two sulphanilamide groups had been developed for external application.

IN their fourteenth annual report the Universities Federation for Animal Welfare (UFAW) admit that they are carrying on under difficulties. Their main stronghold, the University of London, has been scattered through the provinces, their honorary officers are preoccupied with service duties. Since the report was written their London offices have been wrecked by enemy action. But UFAW's morale is unshaken. Though the war may have restricted their opportunities, under their new president, Sir Peter Chalmers Mitchell, F.R.S., they are resolute that they will lose no chance of advancing a step here and a step there. The scientific investigations committee has been active and new members have been gained, especially in the University of Oxford. For the present the work is being carried on from the home of the general secretary and all letters should be addressed to Hall Place, Lyndhurst Terrace, London, N.W.3.

Reviews of Books

The Factors of the Mind

An Introduction to Factor-analysis in Psychology. By CYRIL BURT, M.A., D.Sc. Oxfd, professor of psychology in the University of London. London: University of London Press. Pp. 509. 21*s.*

THE factors of the mind, in Professor Burt's sense of the word, are qualities the existence of which can be deduced from the results of different tests applied to suitable groups of subjects. Thus Spearman's *g* is a general factor present in all intellectual processes, as distinct from specific factors, like verbal or arithmetical ability, which occur only within a limited range of processes. Factor-analysis is the technique by which logical and mathematical principles are applied to the figures obtained from psychological tests first used on empirical grounds and presumed to measure some factors of the mind. The possibility of measuring these factors is still criticised, and Professor Burt is at pains to defend it. He notes that the relative order of merit of pupils, as judged by class-teachers, may prove incapable of useful analysis because "merit" denotes a complex and therefore doubtful quality; but it may be analysable into two or more factors, such as intelligence and industry and perhaps speed of memorisation, that are independent of each other and can usefully be arranged in a linear series. He claims, in face of opposition both ancient and modern, that his material is fit subject matter for science because its agreement with facts is demonstrated by the power of prediction; for, says he, "the psychologist's prediction of what a child will do in certain tests tomorrow is far more accurate than the meteorologist's predictions of what tomorrow's weather will be." Practice and theory are closely linked in the book, a pretty problem being given by that common experiment in which a group of persons is asked to rank a series of English compositions in order of merit. If the group are school-children, and the compositions are by authors of known repute, then we incline to treat the results as a measure of the children's powers of appreciation; but if the compositions are children's essays then grown-up judges in their pride treat the results as a measure of the value of the essays. The factorial analyst would say that the results express the interaction between the test stimuli and the qualities of the judges; which of these we treat as constants and which as variables depends upon what we are trying to study and how we plan the experiment.

This book deals with only a part of a subject in which Professor Burt is an acknowledged master. It must be confessed that the mathematical descriptions and discussions are not easily within the scope of many of us, but now that the connexion between emotional make-up and physical disorders is becoming recognised and clinically studied we must keep a watchful eye on such work as this. Those concerned, for example, in working out statistically the relation between temperamental qualities and the incidence of peptic ulcer might find help and confirmation in the use of factor-analysis, for Professor Burt indicates that his theorems are applicable to the factorisation not only of intellectual but of emotional, moral, or temperamental traits.

The Foot and Ankle

By PHILIP LEWIN, M.D., F.A.C.S., associate professor of bone and joint surgery, Northwestern University medical school; professor of orthopædic surgery, post-graduate medical school of Cook County Hospital. London: Henry Kimpton. Pp. 620. 42*s.*

Dr. Lewin has written a book on the foot and ankle for "the student, general practitioner, industrial surgeon and the younger orthopædic surgeon"; a truly formidable task. In the opening chapters he gives an excellent account of the practical anatomy and the physiology and mechanics of the normal foot and ankle, after which he discusses the abnormalities which may occur. These chapters are followed by a detailed description of that often neglected article, the shoe, and clear diagrams are given to show modifications of the ordinary commercial shoe for the relief of various orthopædic conditions. In succeeding chapters most of the known disorders of the foot and ankle are discussed, but Dr. Lewin would have been more helpful if he had given more details of accepted methods of treatment. Thus in the chapter on plaster technique Böhler's non-padded plaster is dismissed in three lines, and fractures and dislocations are also dealt with somewhat briefly, though they are well illustrated by line drawings. No details are given of the correct application of plaster-of-paris, which is so essential to the maintenance of reduction and the avoidance of many complications, and in a short section on military orthopædics no mention is made of the use of the sulphonamide drugs in the treatment of infected wounds, nor is the application to military surgery of the work of Winnett Orr and Trueta referred to. Poliomyelitis is well described, a detailed account being given of the symptoms, differential diagnosis and treatment; but the section on the treatment of the residual paralyses is overloaded; the author refers to at least eight types of arthrodesis of the tarsal joints. Circulatory disturbances of the leg are described in considerable detail and will help those called on to treat such conditions. A well-illustrated section on surgical technique is included. The appendix of pedigrams contains several wisecracks. This work sets out to help too many classes of medical men and so does not quite take its due place as a textbook; but if it acts only as a guide to papers and articles, and as an outline of many operations and other methods of treatment, it will serve a good purpose.

Fractures and other Bone and Joint Injuries

(2nd ed.) By R. WATSON-JONES, M.Ch. (Orth.) Lpool, F.R.C.S. Edinburgh: E. and S. Livingstone. Pp. 724. 50*s.*

THIS work is well arranged, fully and aptly illustrated, and written in an epigrammatic style which does more than clothe the bones. For the postgraduate it may be called an essential book, providing as it does a comprehensive survey based on unrivalled clinical experience. The well-known views of Mr. Watson-Jones may not secure general agreement—he knows that many surgeons would be critical of the method he advocates for treatment of fractures of the shaft of the femur seeing that he tabulates such criticisms and answers them—but they are stimulating views and above all original.

Diseases of the Peripheral Arteries

Diagnosis and Treatment. (2nd ed.) By SAUL S. SAMUELS, M.D. London: Humphrey Milford, Oxford University Press. Pp. 372. 31*s.* 6*d.*

IN this edition Dr. Samuels provides further evidence of the value of conservatism in the treatment of peripheral arterial disease; major amputation has been required in only one out of his 350 cases of thromboangiitis obliterans, and this experience justifies the publication of the details of the therapy employed. The author doubts the value not only of surgery but also of the more elaborate physiotherapy which has been advocated recently for obliterative arteritis, and confines his attention almost entirely to stopping smoking, proper posture of the affected limb including postural exercises, hypertonic solutions by intravenous injection, and the local application of mild antiseptics to gangrenous digits. He makes useful suggestions for the treatment of pain, the control of which is the most serious problem in the management of patients submitted to non-operative treatment. He attaches much importance to oscillometry in the diagnosis and prognosis of peripheral vascular disease, more especially when it is of the arteriosclerotic type; and certainly the method ought to be employed more extensively than it is at present. Fuller after-history of feet which have healed under Dr. Samuels's regime would be welcome, and so would clearer indication of the limitations of the method in the arteriosclerotic group. At the end of the book there are short chapters on Raynaud's disease, erythromelalgia, acrocyanosis, periarteritis nodosa, essential thrombophilia, embolism, cervical rib, axillary thrombosis, frostbite, ergotism and aneurysms, but the space allowed has scarcely been sufficient to make the accounts in any way comparable in value to that of organic obliterative arteritis.

THE LANCET

LONDON: SATURDAY, MARCH 1, 1941

WAR DOCTOR

THE rise of the Army Medical Service to its full stature in the last war was one of the landmarks in the history of medicine and a significant event in the life of our people. This is no mere rhetoric, no vaporising of a self-conscious profession, but the calm judgment of public men who reviewed what had happened at the close of the war. Speaking on June 8, 1920, to a great company met to do honour to the medical service of the Army our present PRIME MINISTER urged his audience to imagine what it must have meant to thousands of homes and hundreds of thousands of men, in periods of the greatest human weakness and misfortune, to know that the great mass of suffering, misery and shattered figures which represented war could cast itself upon the mercy of the Royal Army Medical Corps, never to find that mercy lacking. Lord MIDLETON who presided remarked that this was the only occasion since the armistice when a particular branch of the Army had been the object of public ovation. And if further confirmation is needed it may be found in the preface to the first chapter of the Medical History of the Great War which twice recalls "the singular freedom of the Army Medical Service from adverse criticism" when in previous wars the breakdowns in arrangements for the care of sick and wounded gave birth to masses of printed evidence in reports of royal commissions and parliamentary inquiries.

How the transformation was brought about bears repetition. It was SIDNEY HERBERT who after the Crimean War gave the lead in Army medical reform. But nothing much was done until, as KEOGH used to say, God sent the cause of medical reform two men—MIDLETON and HALDANE. Lord MIDLETON gave the R.A.M.C. the opportunity for postgraduate study which assured their scientific position. Lord HALDANE had brought the regular medical officer into close touch with the civilian branch of his profession. MIDLETON on that occasion himself told the story. There were, he said, men in that room who could remember the days when in a large cantonment the only site assigned for a hospital where capital operations were to be performed was a vacant spot between a dust-heap and a slaughter-house, and when the last man to hear of any intended move of the Army was the senior medical officer. In every war up to that war the medical service had been hurried into the field, although starved in numbers for peace service, insufficiently paid, without leisure or opportunity for scientific training, with scant opportunity for practising modern surgery, separated by a water-tight partition from the great civil profession which could be its only effective reserve. But nowadays, he went on, the men who held the commands in peace were so chosen as to hold the same commands in war. The equipment designed for peace was the same as the equipment for war. The gap between civilian and professional soldier was so bridged over that the professional service could be developed into a national force. Mr. CHURCHILL, confessing himself as one who had in former days been Lord MIDLETON'S critic, "youthful, ignorant and hard," rejoiced in having the opportunity of saying that his work in reorganisation had been signally vindicated.

What was true of the last war is true also of this, maybe in even larger measure. There has been little if any criticism of the teamwork of the Army medical department and when the carnage is over there will be thousands of soldiers and soldiers' families who will look back with quiet thankfulness on what their medical service did for them. It is not from the soldier that the complaint may come but from the civilians at the front, for in bridging the gap between the civilian and professional soldier MIDLETON made it possible for enough of the profession to pass over on to the soldier's side to starve the civilian of medical aid—and this is what is happening. It was MIDLETON'S service to bridge the gap for one-way traffic; it may well be for a statesman of equal calibre to turn the bridge into a broad thoroughfare that can serve an all-in war. Heretofore in its immediate medical preparedness for war the continental system had the advantage. For a vast standing army the professional soldier's doctor is a necessity and he was segregated at an early stage in his career. Chemistry and physics behind him, the French medical student who elected to go into the army entered the Val-de-Grâce where he learnt soldiering and doctoring side by side and became a medical soldier rather than a military doctor. This was never the case here where medicine was more jealous of her essential nature and where six or seven years of the Hippocratic discipline deprived a man of any leaning towards other gods. And happy for us that it was so, for the total war has knocked the bottom out of the continental system; where every citizen is a potential war casualty it is a question of war doctor not soldier's doctor. Nor is the exchange impracticable, or even difficult, in a country with a genius for solving problems as they arise. True there are four services competing for medical personnel although, as we have said before, there is here no sordid clash of personal interest. These medical services are responsible to four state departments, three of defence and one of health, and we do most urgently require a medical war cabinet, with executive power, to reconcile their needs (and perhaps those of the Dominions too) and to ensure that enough of the right men are in the right place, whatever may befall us. Let the PRIME MINISTER, who is still youthful and even stubborn, but very knowing, let him give the medical services a common council, presided over by a man of his own choosing.

SEDATION OF THE BOWEL

THE value of opium in checking diarrhœa has been appreciated for long enough, but only comparatively recently have we begun to understand the mechanism of its action. The slow accumulation of knowledge has not been due to sloth; on the contrary, a vast amount of published work bears witness to our

diligence in seeking the explanation of this phenomenon. For many years the issue was confused by the workers who could not see beyond the depressant effect of morphine on the central nervous system. They assumed too readily that the constipation following morphine must be due to depression of the bowel resulting in diminished peristalsis. From faulty premise to prolixity is an easy step, and it is significant that by 1920 UHLMANN and ABELIN[1] were able to quote no fewer than 314 contributions to the controversy that was still raging over the mode of action of morphine on the bowel.

The earlier workers in this field held that the alkaloid acted by depression of the reflexes arising in the plexuses of Auerbach and Meissner. NOTHNAGEL[2], on the other hand, postulated central stimulation of the inhibitory splanchnic fibres. Other investigators failed to confirm that depression of the bowel actually occurred, and some unexpected observations were made, notably that morphine still produced constipation even when the extrinsic nerve-supply to the bowel was severed; and, far from depressing the bowel-wall, experiments on excised intestine showed that the predominating effect of morphine was stimulation.[3] In retrospect it seems curious that the dispute should have lasted so long, when such broad hints as to the probable explanation were contained in the already published researches on the effects of this alkaloid on the stomach. Thus, ZEHBE[4] as early as 1913 demonstrated radiographically in man persistent closure of the prepyloric ring after the administration of morphine; and, working on animals, MAGNUS[5] had demonstrated the same action in 1908. Despite the excellence of MAGNUS'S pioneer work in this direction, he may now be accused of drawing a red herring across the path by his suggestion that the most important factor in morphine constipation was the hold-up of food at the prepyloric ring. That this is a contributory cause cannot be denied, but it remained for PLANT and MILLER[6] to demonstrate conclusively the nature of the stimulating effect of morphine on the bowel in dogs and in man, and to prove that this action is the main cause of morphine constipation. In dogs their results were obtained by experimental methods involving the use of the Thiry-Vella fistula; in man their observations were made on patients with thin-walled herniæ of the abdominal parietes, and by noting pressure changes in permanent fistulæ. After hypodermic injection of morphine there is a great increase of tone in the small intestine and a simultaneous rise in peristaltic and segmental activity. The augmented propulsive movements last only about half an hour and thereafter they are depressed for several hours. In man the resultant effect of these changes is intestinal stasis. Except where there is idiosyncrasy to the drug spasticity of the bowel dominates the pharmacological picture, and the passage of the intestinal contents is consequently hindered despite the initially enhanced peristaltic activity. The diarrhœa which not infrequently occurs in dogs and which is a rare manifestation of idiosyncrasy in man is probably explained by a fleeting preponderance of the increase in peristaltic activity over intestinal spasticity.

Although these results have helped to clarify our views on the main pharmacological actions of morphine on the alimentary canal, there remain for solution many minor problems. Of these, the study of morphine-atropine antagonism is interesting to the laboratory worker and not unimportant to the clinician. The evidence in favour of a purely local action of morphine on the small intestine includes the statement that increased tonus persists even after atropinisation. It now appears that this applies only to small or moderate doses of atropine, for more recent work by KANAN[7] and by GRUBER and others[8] reveals that large doses do abolish the intestinal spasticity produced by morphine. According to ADLER and IVY[9] the triple stimulating effect of morphine on the ileum is seen also in the colon, but morphine-atropine antagonism is apparently not so complete in this part of the bowel. The propulsive movements produced by morphine in the colon can be abolished by the previous administration of atropine; and by careful adjustment of the proportions of the two drugs both the propulsive and non-propulsive side-effects of morphine can be eliminated without interfering with the increased spasticity of the colon. At their face value, these findings suggest that there is some justification for using atropine as an adjuvant to morphine when intestinal quiescence is desired. Variation in the susceptibility of different species of animals to drugs accounts for the heavy dosage of morphine and atropine used in the experiments on dogs (the corresponding amounts for a man of average weight would be about gr. 1 of morphine and gr. $\frac{1}{20}$ of atropine). These experimental results must therefore be regarded only as pointers, and the next step is to test their applicability to man. And here it must be emphasised that not only are there often unexpected differences between human and animal pharmacology but where the vegetative nervous system is concerned responses to drugs are sometimes amphoteric; that is to say, the response can be reversed by altering the dosage.[10] In this connexion, the experimental work of UHLMANN and ABELIN[1] is of special importance, for they showed that while large doses of morphine increase the tone and contractions of the intestine very small amounts reduce both forms of activity. Whatever may be the explanation of this, it seems that work on morphine-atropine antagonism is reviving uncertainty as to the relative importance in the genesis of morphine constipation of the intestinal muscle on the one hand and the nerve-supply of the bowel on the other. The researcher in this sphere is indeed compassed about with a multitude of exasperating difficulties, more particularly if he confines himself to observations on animals. There is much to be said for following the example of PLANT and MILLER who supplemented their laboratory findings with observations on patients in the surgical wards.

1. Uhlmann, F. and Abelin, J. *Z. exp. Path. Therap.* 1920, **21**, 58.
2. Nothnagel, H. *Arch. path. Anat.* 1882, **89**, 2.
3. Baur, M. *Z. ges. exp. Med.* 1924, **44**, 540.
4. Zehbe, M. *Ther. Mon.* 1913, **27**, 406.
5. Magnus, R. *Pflüg. Arch. ges. Physiol.* 1908, **122**, 210.
6. Plant, O. H. and Miller, G. H. *J. Pharmacol.* 1926, **27**, 361.
7. Kanan, M. A. *Proc. Soc. exp. Biol., N.Y.* 1937, **36**, 506.
8. Gruber, C. M., Greene, W. W., Drayer, C. S. and Crawford, W. M. *J. Pharmacol.* 1930, **38**, 389.
9. Adler, H. F. and Ivy, A. C. *Ibid*, 1940, **70**, 454.
10. Sollmann, T. *Manual of Pharmacology*, 1936, Philadelphia, p. 335.

RESEARCH IN GENERAL PRACTICE

IN a story which gave many of us a thrill forty years ago, "Ships that pass in the Night," BEATRICE HARRADEN wrote a charming parable. It concerned a man who from childhood had dreamed of finding the temple of the ideal which he thought was placed on the summit of an almost inaccessible mountain. After years of effort he at last scaled the mountain to learn that this was not the place; the temple was in the valley he had left. The practitioner who "has no opportunity for research" might consider this tale. On another page two general practitioners and an obstetric surgeon have drawn some useful lessons from the analysis of their cases of breech labour. Their numbers are small, but they show clearly that although this faulty presentation in no way affects the chances of the mother it is a catastrophe for the child, and they make out a good case for their conclusion that if version fails cæsarean section is the treatment of choice, especially in primigravidæ or where there is some degree of pelvic contraction. Nothing spectacular about the analysis of such records, none of the splendid ritual of white-coated priests inoculating guineapigs, not even the mysterious but impressive algebra of super-statisticians. Yet it should be remembered that the father of medical statistics was a city tradesman who knew no algebra at all, that in the enlightened 19th century it was not a highly trained "scientist" but a licentiate of the Society of Apothecaries who left general practice to create the best system of medical statistics in the world, and that the most original contribution to epidemiology of recent years was made by a general practitioner in Wensleydale. It is tempting to emulate Bishop BERKELEY'S "Querist" and submit some interrogatories. Do we identify the technically difficult with the important? Do we think that no important truths can be discovered by simple methods? Is it possible that if medical neighbours and friends pooled their experience discoveries might be made which had escaped the Ministry of Health and the research units of the teaching hospitals? The times in which we live, when we are all thrown back on our own resources, and when so much is happening that the "experts" are too busy to record, sharpen the point of these questions. In many ways we are forced to live more simply, to do without many things we thought were necessary. Intellectual snobbishness, reliance on experts, fear of doing simple things, might well be added to the list of contraband of war.

We must not underestimate the difficulties of the general practitioner when it comes to preparing his records for publication. His patients will not appreciate the extra investigations and the thorough inquiry needed to make a clinical case complete; again, these things take time, and must be added to a daily round which may already be long enough; examination of a stool in general practice is no simple matter of "Please send fæcal specimen to bact. lab." on the bed-letter, but a complicated process, from obtaining a specimen pot and instructing an amateur in its use, to packing and despatching it to the laboratory. When all is done there is the writing up in such a form as to catch the critical eye of some editor. But our peripatetic correspondent was widely wrong when he suggested last week that the medical journals look askance at such papers. Alas that there are so few for them to look askance at. Papers like that of Mr. GAIRDNER and Dr. and Mrs. JACKSON are what we are in urgent need of, not only in obstetrics but in the whole field of medicine. Many doctors in insurance practice, sometimes with the encouragement of the regional medical officer, have made records which have proved well worth the time expended on them and should be analysed for the benefit of the rest of the profession. To get their full value, however, some pooling would be necessary, and here the R.M.O. (when he returns) could help, as well as by initiating special inquiries. For ailments outside the insurance sphere the stimulus might come from the hospital consultants. One can foresee the time when the riddle of cramp, of gastric influenza or of neonatal hæmorrhage is solved by the Blankshire group.

Annotations

MEDICAL TREATMENT OF FRACTURES

OPINIONS on the value of biochemical methods in accelerating the union of fractures and in the treatment of established non-union vary between the enthusiastic and the dourly sceptical. Surgeons in this country, who tend in the main to be conservatively attached to effective and continued immobilisation, will probably be a little suspicious of what C. F. and R. C. Nelson[1] term "the medical management of fractures." They describe the use of vitamins and hormones in the treatment of 1000 cases, the objective being primary healing with a minimum of callus. The serum calcium and phosphorus were estimated at the outset by a simple technique in order to provide the basis for treatment, and it was found that the former was low in 85% of all recent cases. Measures to raise the calcium content are advocated therefore whenever laboratory facilities are not available. These measures include the giving of two pints of milk daily, the administration of calcium gluconate by mouth and subcutaneously, and the injection of parathyroid extract at intervals of a few days. It is maintained that by these methods the serum calcium can be raised to the desired level, the effect being demonstrable within 10–15 days. Should the serum phosphorus be low, liver, eggs, fish and cheese are included in the diet and vitamin D is given in doses up to 3000 units daily. The Nelsons point out that in normal cases vitamin D raises the phosphorus level unduly and delays union; it should never be given routinely but only in the 25% of individuals with an initially subnormal value. During the period of treatment ℥ 15–20 of dilute hydrochloric acid is given with meals to facilitate the absorption of calcium and phosphorus from the bowel, and the urine must be kept acid throughout in order to avoid the precipitation of calcium in the urinary tract. The object of this regime is to establish a serum calcium of 10·5–12 mg. and a serum phosphorus of 3·5–4 mg. per 100 c.cm., and to maintain this 3 : 1 ratio. For the simple Colles fracture and comparable injuries dietary methods only are employed, and where late absorption is feared, as in fractures of the femoral neck, dietary control is continued for many months. In suspected acromegaly or myxœdema, or when the basal metabolic rate is low, thyroid extract is given, and iodine is administered to thyrotoxic cases. The American workers claim not only to have prevented non-union in recent cases but to have effected sound union in delayed cases even without strict immobilisation. However, their series lacks controls and no reference is made to the mechanical and vascular factors in the process of healing. In this country R. T. Stirling[2] has given some attention to the biochemical aspects of

1. *J. Amer med. Ass.* Jan. 18, 1941, p. 184.
2. See *Lancet*, 1939, **2**, 428.

fractures, and has suggested the prophylactic use of vitamin C in the avoidance of excessive weak callus. He does not consider, though, that hormones are of proved value in the ordinary case and attributes the vast majority of instances of non-union to imperfect reduction and faulty immobilisation. Nevertheless, the paper by the Nelsons reminds us that there is a chemical as well as a mechanical side to the healing of fractures, and suggests the value of more frequent estimations of the serum calcium and phosphorus in selected cases. Where in the absence of some gross endocrine disturbance a significant deficiency is found their regime might be worth trying.

NUPERCAINE SPINAL ANÆSTHESIA

ON a total experience of 500 cases Hand and Sise [1] of the Lahey Clinic in Boston and Rapoport [2] of New York speak highly of Nupercaine for spinal anæsthesia, and those in England who are familiar with the drug, under its name of Percaine, will agree. These American workers used only the hypobaric 1 : 1500 solution. Nupercaine is readily soluble in water and alcohol, and has the advantage that it may be boiled repeatedly without decomposition. An important practical point is that the drug precipitates as a free base in even slightly alkaline solution, and this is indicated by cloudiness. Syringes and needles to be used for nupercaine should therefore be washed out immediately beforehand in sterile water acidified with a few drops of acetic acid, or in 1 c.cm. of the 1 in 1500 solution itself which has a slightly acid reaction. Hand and Sise have used the drug in two main groups of cases—for upper abdominal operations expected to take a long time, and for operations in which for positional reasons hypobaric rather than hyperbaric solutions are required. They favour fairly heavy premedication, the average adult being given gr. 1/3 of Omnopon and gr. 1/150 of scopolamine subcutaneously 2 hours before operation and gr. 3 of Nembutal by mouth an hour before operation. The patient therefore arrives in the operating-theatre very sleepy. Just before the spinal anæsthetic is introduced 50 mg. of ephedrine sulphate is given intramuscularly. The dose of nupercaine is simply calculated from the height and sex of the patient. For upper abdominal anæsthesia the injection is made in the 2nd lumbar interspace ; 5 c.cm. of cerebrospinal fluid is discarded and the nupercaine, warmed to or slightly above body temperature, is then injected at 0·5 c.cm. per sec. The injection is made with the patient lying level and on his side and he is then turned face downwards. Nupercaine is effective in very dilute solution and its anæsthesia lasts a long time. For upper abdominal surgery it gives excellent muscular relaxation, anæsthesia develops within 4–12 min. of the injection and lasts for 2–3 hours. Supplementary general anæsthesia is valuable in many cases apart from those where the operation is prolonged beyond the duration of the spinal anæsthetic, "to lessen the technical surgical difficulties and to alleviate mental and physical discomfort to the patient." Hand and Sise describe nupercaine as having little or no depressant action on the cardiovascular system and note that "when the changes in blood-pressure occur they are usually sudden and marked, are associated with nausea and retching, and appear to be initiated by manipulation of and traction on the abdominal contents, chiefly in upper abdominal operations." In their experience the early employment of supplementary general anæsthesia (either cyclopropane or intravenous Pentothal) prevents the fall in blood-pressure due to intra-abdominal manipulations. A rare complication is sudden unconsciousness as the patient is placed in the initial prone position, presumably due to cerebral anæmia ; this can be rectified by intravenous injection of a cardiovascular stimulant, for example pitressin and ephedrine. Both Rapoport and Hand and Sise use nupercaine spinal anæsthesia largely for "poor risks," but in this country many anæsthetists hold that spinal anæsthesia is best avoided in shocked and toxic patients.

The great variety of trade names which may be given to the same drug in different countries is a perpetual source of perplexity to medical men, and makes it unnecessarily difficult to keep abreast with the current literature. Here is a case in point on which we have already commented.[3] The confusion of percaine with procaine (Novocain) has been known to lead to a fatal issue, though both are safe spinal anæsthetics when given in the correct dose and proper manner. The general adoption of the name nupercaine would clearly be an advantage, and there is a good case for the adoption by the various drug supply firms of a single name for each individual drug whe.ever it is marketed.

TRICHINIASIS IN 1922 AND 1941

THE last outbreak of trichiniasis in England was at Milford Haven in 1922, and it is of interest to compare it with the one now in progress at Wolverhampton and Harpenden. In 1922 there were only 13 cases, compared with the 500 already estimated by Sheldon to have occurred in Wolverhampton.[4] The diagnosis was made at Milford Haven on the eosinophilia and on the discovery, in two cases, of *Trichinella spiralis* parasites in the fæces. The examination was carried out on fairly thick films which were pressed between photographic plates and examined under a very low power. Embryos have been isolated from fæces in the present epidemic by Prof. R. T. Leiper, but the diagnosis was originally established by biopsy of muscle, a method which does not seem to have been used in 1922.

The eosinophilia in the 1922 epidemic ranged from 15·7 to 39·6% ; at Wolverhampton the eosinophil count has been less characteristic, ranging from 1 to 49% in seven cases reported by Lee.[5] His figures show that the eosinophil count may vary widely at different stages of the same case—in one from 3 to 33%, in another from 49 to 5%. At Harpenden the figures have been steadier, ranging, in five cases reported by Garrod and MacLean,[6] from 27 to 47%. The clinical features of the 1922 epidemic were similar to but not identical with the present ones. Patients in 1922 showed gastro-intestinal disturbance and epigastric pain at the onset, with vomiting and diarrhœa ; in the present epidemic gastro-intestinal symptoms have been largely absent, and constipation is the rule, but vomiting has occurred in about a third of the cases towards the middle of the illness. In typical cases of both epidemics, an early symptom noted by the patient was swelling of the eyelids and headache. Among the 1922 cases the conjunctiva was sometimes red and œdematous, and in the present epidemic the conjunctiva sometimes protrudes through the closed eyelids "as a bulbous watery mass." Muscle pains appear to have been severe in this epidemic, sometimes amounting to agony (three women claimed to prefer labour pains) ; in 1922 patients noted especially the pain of changing from one position to another, and one man, whose diaphragm was probably affected, complained of great pain in the chest. Cough has been a symptom in the recent cases, but in 1922 there was no evidence of lung involvement ; there was, however, dyspnœa on movement. Signs of damage to the central nervous system were common in both epidemics, varying from transient paresis or depression to severe delirium or signs of a cerebellar lesion. Some of the present cases have simulated meningitis, in others the patients have been mentally lethargic and sleepy ; this contrasts with insomnia which was a distressing symptom in most of

1. Hand, L. V. and Sise, L. F., *Surg. Gynec. Obstet.* 1940, **9**, 9.
2. Rapoport, G. *Anesth. & Analges*, 1940, **19**, 154–156.
3. *Lancet*, 1939, **2**, 944.
4. Sheldon, J. H. *Lancet*, Feb. 15, p. 204.
5. Lee, J. E. S. *Brit. med. J.* Feb. 15, p. 237.
6. Garrod, L. P. and MacLean, D. *Ibid*, p. 240.

the 1922 cases, as were also prostration, anæmia and wasting. Hæmorrhage under the nails, noted by Sheldon in the present epidemic, was not observed in 1922. In 1922 the sausage was proved to be the criminal and it is likely to be convicted again this time. In pigs the muscles chiefly invaded by the parasite are the diaphragm, intercostals and neck muscles, all of which are commonly used to make sausages. In Wolverhampton busy women eat sausage meat raw; in Milford Haven 19 years ago thirteen infected people ate sausages obtained from a particular butcher. His pork was raised and slaughtered locally, but the farmer who had supplied the unlucky pig was not identified. At Harpenden the source of the infected pork is still uncertain. This week cases have been reported in two districts of Cumberland.

One of the chief features of this disease is muscular pain and stiffness, and patients may therefore be seeking treatment for "rheumatism" and may on that account be mis-diagnosed unless a blood count is done. Eosinophilia is likely to occur towards the end of the first week and to persist for about six weeks, and recent cases in this outbreak have shown 20–70% of eosinophils.

THE CONSTITUTIONAL FACTOR IN BEHAVIOUR DISTURBANCE

In assessing the relative importance of environment and constitution in the causation of such abnormalities of behaviour as are seen in the psychoneuroses, in subjects with psychopathic personalities, and even in the psychoses, psychologists have been hampered by inadequate criteria of constitutional defect. It is true that gross somatic signs of degeneration are often present, particularly in the shape of the face and head, and that a detailed family history often gives a clue to causation, but even so the question of the hen and the egg arises. In most instances environment has played a precipitating part, and some people remain normal only through the stability of their surroundings and the sympathetic skill with which their lives are controlled by others. The electroencephalogram has brought to hand a new index of abnormality. Cerebral dysfunction—whether caused by gross damage, by such agents as intracranial tumours, abscesses or the toxæmias, or by more subtle states, such as the changes underlying epilepsy or the genetic aberration in the members of an unstable stock—is associated with abnormally slow alterations in cerebral electrical potential which can be readily recorded and measured. Lindsley and Cutts[1] have produced further convincing evidence of the important part played by constitutional defects in the causation of even the milder grades of behaviour disorders. They have taken groups of normal children and intelligent healthy adults and have contrasted their electroencephalograms with those of a group of 50 behaviour problem children, and of 30 children whom they considered to be constitutionally inferior. The behaviour problems were sufficiently definite for the children to be admitted to a special hospital, and included such things as irritability, restlessness, temper tantrams, lying, stealing and obscenity leading to unmanageability in the home and delinquency in the community. The 30 constitutionally inferior children were wards of the state who were found to be unplaceable in foster homes, and who had a poor biological and social heritage. By studying the characteristics of different groups of abnormal waves in the electroencephalogram, Lindsley and Cutts found a great preponderance of abnormality both in children with known behaviour disturbance and in those who were constitutionally inferior. For example, while only 3% of the normal adults and 30% of normal children showed more than 5–8 waves a second, 80–90% of the abnormal children gave readings above this level. Thus abnormal electroencephalograms were three times as common in children with abnormal behaviour as in normal children. This suggests a disturbance of cerebral function which may be important in preventing the abnormal groups from adjusting themselves to their environment, particularly if conditions are adverse. Similarly, we might expect that the so-called normal children who showed evidences of abnormality in the electroencephalogram would be relatively poorer risks in the face of persistent environmental difficulties.

1. Lindsley, D. B., Cutts, K. K. *Arch. Neurol. Psychiat.* 1940, **44**, 1199.

MECHANISM OF THE CARPUS

The mechanical anatomy of the carpus has lately been worked out by MacConaill.[1] The capitate and hamate move together, as do the lunate and triquetral, while the scaphoid moves sometimes with one row and sometimes with the other. The other bones can be excluded from the discussion. He regards the capitate as the fixed bone in all movements. In dorsal flexion the lunate slides round the capitate, and the radius slides round the lunate in even greater degree. In the movement from full volar flexion to full dorsal flexion the scaphoid moves on the capitate until the hand is straight, but after this position has been passed these two bones remain fixed while the lunate moves on them both. This locking together of the scaphoid and capitate is of supreme importance. MacConaill says that the proximal articular surfaces of the hamate and capitate form a screw surface so that in dorsal flexion the scaphoid and lunate are also brought more closely together. In fact the bones of the carpus are welded together in dorsiflexion and more loosely packed in volar flexion. These observations become of practical value in relation to dislocation of the lunate. The methods of reduction that have been advised in the past, apart from operative reduction, are either simple traction or dorsiflexion followed by volar flexion. If MacConaill's concept is correct, reduction should be more easily achieved by volar flexion followed by dorsiflexion, and this is the method he recommends. The movement of volar flexion draws the carpus over the dislocated lunate bone. Slight traction on the hand helps this, but only the very gentlest pressure on the lunate is required. One minute only is needed for recent dislocations. The movement of dorsiflexion then retains the bone in its reduced position, and this is the position of the subsequent plaster. Late cases will require operative treatment, for in them the space that the lunate should occupy has been partly filled with fibrous tissue. Nine cases, six of which had an associated fracture of the scaphoid or triquetral, have been treated by this method with excellent results.

REACTIONS TO T.A.B. VACCINE

The case for active immunisation of the civil population against enteric fever has been much discussed in recent months, and despite an official caveat that there were no strong grounds for widespread immunisation many local and hospital authorities have undertaken the inoculation of certain classes of the community against both enteric fever and tetanus. One of the objections raised to T.A.B. vaccine is that the local and constitutional reactions which follow the injection result in considerable loss of working time—perhaps more than vaccination would save by preventing enteric fever among an industrial population. T.A.B. vaccines may vary in their toxicity, and clinical comparisons of the immunising properties (as measured by agglutinin-formation) and toxicity of different commercial preparations are needed. There is no reliable evidence that the use of detoxicated or oral vaccines to avoid reactions gives the same degree of protection as a crude vaccine of the whole organism, but care should be taken to use a mouse-virulent strain of *Bacterium typhosum*. *Bact. paratyphosum* C is added to certain vaccines, though infections with A and C are extremely rare in this country, and this T.A.B.C. vaccine should not be

1. MacConaill, M. A. *J. Anat.* January, 1941, p. 166.

confused with the typhoid and cholera vaccine, which as suggested in our issue of Feb. 15 (p. 234) might be known as "T.A.B.Chol." vaccine.

Dr. Maurice Williams,[1] medical officer of health for Southampton, was among the first to use T.A.B. vaccine on a large scale to protect the civil population, and he has now reported an analysis of the reactions and loss of working time amongst large groups of male and female manual and sedentary workers. Only 30 working days were lost among a total of 10,032 persons after a first dose of the Lister T.A.B.C. vaccine (0·3 c.cm. for women and 0·5 c.cm. for men). Among 1872 male manual workers there was no time lost, although 27·2% of them had combined local and general reactions. It is not stated whether or not an effort was made to inoculate mostly at the week-end. Combined reactions were most frequent among male sedentary workers, 2782 of whom lost 15 working days. Female manual and sedentary workers were much alike in the proportion of local and general reactions and in time lost. It was noted that those with severe general reactions usually had mild local reactions, but the paucity of reaction in this mass-inoculation of an industrial population should help to lay one of the bogies of the T.A.B. vaccine.

THE DISCOVERER OF INSULIN

Sir Frederick Banting, F.R.S., lost his life when the aeroplane in which he was pursuing his research work crashed in Trinity Bay, Newfoundland. So ends nobly a meteoric career of great service to suffering humanity. The discovery of insulin in 1922 was not an isolated brain-wave, but the painstaking push to a successful issue of a train of thought started thirty years before by Minkowski and Mering when they showed that the pancreas must have an internal secretion dealing with sugar in the blood as well as an external secretion dealing with foodstuffs in the gut. But this internal secretion of the islands of Langerhans eluded them as well as Schäfer who called it insulin without being able to isolate it. The dead pancreas continued to guard its secret although in 1908 Zuelzer and Scott extracted small quantities of an active substance which proved too toxic for human use. But Banting was not to be baulked by the failure of others from securing so glittering a prize. Macleod's department in Toronto had given him a new technique of estimating minute changes in the blood-sugar. Best's skill enabled him to block the external secretion in dogs and recover from the still intact islands an extract which cured experimentally diabetic dogs. Armed with this confidence Banting and Best quickly verified the suspicion that the insulin was there in the dead pancreas all right and could be extracted with alcohol before its destruction by ferments. And finally Collip purified the extract from its toxic constituents so that it could safely be given to patients. It all seems so simple now—the relentless pursuit of truth to its logical conclusion. Banting deserves his place in the long gallery of those who have found a remedy for disease; he is one of that smaller band who found a talisman which may open other doors.

BLEACH CREAM FOR THE MAN IN THE STREET

THE Minister of Home Security has sent letters to local authorities asking them to request the help of all pharmacies in Great Britain in a scheme for making bleach cream available for members of the public if the enemy uses blister gas. The scheme is a simple one. The proprietor of each pharmacy, having been provided by the local authority with two enamel pails and 14 lb. of tropical bleach, is to be asked, as soon as gas is used, to mix bleach cream in the pails, and if blister-gas is being dropped in the vicinity to place the pails of cream on the pavement outside his shop with a poster instructing the public how to apply it. It has been agreed with the Pharmaceutical Society, whose ready collaboration the Minister of Home Security acknowledges, that pharmacists should be asked to perform this service without payment, as part of their contribution to the national effort. The Minister's letter says: "Gas has not been used and the scheme is therefore precautionary only. It has been decided to ask pharmacists to coöperate because they possess the necessary technical skill for making the cream and their pharmacies are well spread over all populous areas." It is also stated that anti-gas ointment No 2 (chloramine) is now available for commercial sale at controlled prices from manufacturers who have received special permission from the Ministry. As supplies become more freely available, it is hoped that pharmacists will stock this ointment, but it cannot be expected that more than a limited proportion of the public will ever be able to buy their own supplies. The scheme for bleach cream is a supplementary safeguard.

1. *Publ. Hlth*, January, 1941, p. 61.

ENDEMIC FLUOROSIS

IN a leading article on p. 216 of our issue of Feb. 15 we were able to give first-hand information about the distribution of fluorine-bearing minerals and how the fluorine may find its way into drinking-water or into the fumes from kilns and so give rise to signs of fluorosis in man and animals. The geological information was supplied for publication by Mr. C. N. Bromehead with the permission of the director of the Geological Survey, and we regret that no acknowledgement of its source appeared in the article. The evidence is noteworthy as connecting, for the first time so far as is known, the incidence of fluorosis with the nature of the subsoil of this country.

A WORKING DAY

THE gipsy strain in mankind gives little encouragement to those who try to regiment us. The eight-hour shift, so just and symmetrical on paper, gets anything but a warm reception from those who are invited to work it. Miss F. Isabel Taylor, senior deputy chief inspector of factories, reports[1] that when workers had a choice between the two eight-hour shift system and long hours on a single shift, the single shift was generally chosen. One reason for this is that people dislike coming on duty at unorthodox times. Eight-hour turns are apt to begin at 6 A.M. and 10 P.M.; workers—anyhow, at the beginning of the war—disliked going about the dark and lonely streets at these hours. Again, the eight-hour shifts meant a loss of money which would otherwise be earned for overtime, and which was welcome in families where incomes had been reduced by the recruitment of young men. Sometimes, too, there are insufficient workers in a district to make up even two—much less three—eight-hour shifts, and, even where ordinary labourers were plentiful, skilled tool setters and other key men were scarce; so that it was simply not practicable to arrange two or three shifts instead of one. Where long overtime had to be worked, people preferred some long days and some short days rather than an arrangement of hours which left no evening free for shopping or a visit to the cinema. They even preferred to spend only 10 or 15 minutes over tea, and get home a quarter of an hour earlier, rather than to take the regulation half hour. Perhaps some of them are biologically right in preferring variety and dash to ordered regularity. The factory hand is probably in greater danger from the effects of monotony than is any other kind of worker, and if he knows a way to make his life satisfying and various he ought to be able to take it.

We regret to announce the death on Feb. 19, after an accident, of Mr. THOMAS HELMER, L.D.S., deputy dental secretary of the British Dental Association, at the age of 34.

News also reaches us from America of the death in Holland on Dec. 16 of EUGEN DUBOIS of Leyden. In the early 'nineties Professor Dubois discovered pithecanthropus, the famous "missing link," in Java.

1. Annual Report of the Chief Inspector of Factories for the year 1939. London: H.M. Stationery Office, 1s., p. 37.

Special Articles

THE EMERGENCY MEDICAL SERVICE AND THE FUTURE *

By JOHN B. HUNTER, M.C., M.Chir. Camb., F.R.C.S.
SURGEON TO KING'S COLLEGE HOSPITAL AND THE ROYAL CHEST HOSPITAL, LONDON; GROUP OFFICER, E.M.S.

EARLY in 1939 representatives of the staff of the London teaching hospitals met under the title of the Hospitals War Committee, and decided to ask the Voluntary Hospitals Committee to combine with them and meet the Ministry of Health to hear what arrangements were being made in connexion with the medical services if war should break out. The Ministry thereupon put forward their sector scheme whereby twelve members, one from each of the teaching hospitals, should be selected to advise the ministry on hospital arrangements in the London area and link the teaching hospitals to its casualty scheme. England had been divided into independent regions, each with its own commissioner superintending all services and a hospital officer to deal with the medical problems. London presented a special problem on account of its size and vulnerability, and the fact that it had so many hospital beds in proportion to those in the home counties. A rough census of the beds available and buildings suitable for use as hospitals outside London had been made.

EARLY PLANS

The Ministry of Health were relying on their hospital officers to coördinate the arrangements in each region, making use of the county medical officers of health as their agents. The introduction of the sector system in the London region complicated the picture, and naturally the medical officers of health must have questioned the appearance of those strange creatures, the group officers, in their pond; but their goodwill overcame many difficulties. The buildings outside London earmarked for use as hospitals were then carrying on their peacetime function, so that new theatres, X-ray departments and nursing-staff accommodation remained paper schemes, and with few exceptions were not started before war broke out. In September, 1939, when these hospitals were required, staff quarters were short or uncomfortable, and essential services were inadequate. It is difficult to know how this could have been altered, unless the hospitals had been put on a war footing six months or more before war broke out. It was soon clear that the number of beds provided would be inadequate if the figure of casualties given by experts was taken as a guide. Those figures, we know now, were too high, but we had to legislate for them. Existing beds in provisional hospitals were inadequate, and the Ministry decided to put up hutted hospitals, using in most places the administrative services of existing hospitals or institutions. This work was put in hand at once. The huts were not ready until after war had broken out, and a second expansion of hutted hospitals was delayed by difficulties in obtaining material. Groups of beds, or individual buildings, were also earmarked as special centres or hospitals.

EQUIPMENT, STAFF AND TRANSPORT

Lists of surgical instruments for a casualty service were prepared; no attempt was made to provide elaborate surgical equipment. For years past surgeons had been using nothing but hand-forged instruments, and the surgical instrument makers of the country were unable to supply suddenly large quantities of mass-produced instruments and to meet at the same time the requirements of an expeditionary force.

X-ray apparatus, too, fell short of requirements for the expanded number of beds. It was decided that most hospitals would have to be served with portable machines because it was thought to be impossible to move fixed machines out of London in time. Later, plans had to be made to house fixed sets, obtained not only from manufacturers in this country but also in America. By the generosity of the voluntary hospitals, especially those of London, large amounts of equipment were made available. Transport was already planned, not only to take casualties from the scene of the incident, but also for inter-hospital evacuation, and these plans are in operation today.

Lay staff of the emergency hospitals included expert staff (such as theatre porters and technicians), and domestic staff and porters. Expert staff had to be provided from the voluntary hospitals, domestic staff and porters by the local authorities owning the hospitals. It was clear that nursing staff for the increased number of beds could not be provided on a peace-time basis, and that even on a reduced scale there would be shortage—as has proved to be the case. Sector matrons were appointed, and a pool of nurses from the various hospitals was made, including the London County Council hospitals. These were allocated to the emergency hospitals, together with members of the Civil Nursing Reserve, a new body enrolled as a war-time measure. Outside London the arrangements for nursing were in the hands of the regional hospital officers and the county medical officers of health.

In appointing medical staff a rule-of-thumb method could be employed for house-officers, but not for more senior grades. From time to time the group officers pressed for the medical staff to be embodied in the territorial service, but these recommendations were not favourably received. The group officers in the London sectors considered that as the question of remuneration for medical staff affected the whole country, it should be determined by a committee set up by the ministry, in consultation with the advisory committee. For many months the question caused much uneasiness and discussion.

THE PROOF OF THE PUDDING

All the experience of the Ministry of Health had been associated with peace-time health problems, and their only contact with hospital affairs had been through the county medical officers. In starting this new service they harnessed it to existing civil practice, including the voluntary hospital system. But there was bound to be some rigidity—a bureaucratic tendency to procrastination that to many people appeared unforgivable.

When the service came into being, the upgrading in the hospitals was at once begun, and medical and nursing staff reported to their hospitals. The staffs of the London hospitals had uprooted themselves, and they found themselves in strange surroundings. Their clinical work had disappeared, and the theatres and wards among which they found themselves appeared rudimentary, with almost complete absence of those efficient arrangements which were part of their life. But they started with goodwill to reproduce in these new hospitals a replica of the old, and their criticism was chiefly constructive.

No civilian casualties appeared; there was a lull, and the civilian sick returned to the outpatient departments of the hospitals, and arrangements had to be made for their treatment. The ministry decided to transfer cases requiring treatment into the sector hospitals. These hospitals were not equipped for such work and the influx of civilian sick led to further improvement in the equipment of all departments; and this process still goes on.

Certain hospitals were earmarked as convoy hospitals, and to these the Army sick were brought from France; but it was not until the Germans invaded the Low Countries that any wounded were received, and not until the retreat did the service have to deal with large numbers of wounded. The work was well done but some medical officers were not aware of the facilities of the service; they had the feeling that if a case came into their hospital it was up to them to treat it, and see it through, rather than to have it transported to another hospital further afield where there was less crowding and perhaps better facilities for special cases.

In August and September civilian casualties had to be treated, so that the purpose for which the service was created was at last fulfilled. Despite the fact that large numbers of hospital bed were put out of action by bombs, no undue strain was put on the numbers remaining; the emergency hospitals were even able to go on treating the civilian sick.

* Based on a presidential address to the section of surgery of the Royal Society of Medicine given on Feb. 5, 1941.

Some have seen the Emergency Medical Service as the beginning of a state medical service. I do not think that this is true. Nevertheless it soon became clear that a new conception in medical service had come into being. The idea of decentralising the treatment of the urban sick was not new. It had been advocated for many years—whenever one of the large London hospitals was due for rebuilding. The reasons against removal included the difficulty of getting patients to consent to go out, because their relatives might not be able to visit them, and possible difficulty in connexion with the consulting staffs. These have not proved insurmountable; the patients in the sector hospitals are still visited by their friends, and the consulting staffs have found that travelling to and from the sector hospitals has not been so difficult to arrange as was anticipated. It seems that the principle of keeping a small hospital in town, with an adequate outpatient department, and transferring the sick to a hospital in a green belt outside is feasible. The Minister of Health, from the work of the Nuffield Trust, has already seen the possibilities opened up by the regional system. In the country districts enlightened counties have taken advantage of the Hospital Act which permitted them to set up an adequate hospital service; others have not been so forward and these have had to depend on small voluntary and cottage hospitals with insufficient accommodation. The regions include several counties and borough councils, so that a new method of control will have to be evolved, the county control disappearing. But it would be unthinkable not to use the enormous experience of the county medical officers and their staffs in any such scheme.

THE FUTURE

The fallacy of all policies connected with medical services is the position, in the social scheme, of the doctor. We have trained the lay public and ourselves to regard our position in the economic structure as that of a consultant. We are there to give advice, and if they don't like it—whether it takes the form of plans for an operating-theatre or a bottle of medicine—they are at liberty to throw it down the sink. Some change in this outlook will have to come. Medical men will have to be given some kind of executive authority, and the medical profession will have to be ready and willing to assume that authority, so that medical measures for the improved health of the nation are not left to county committees.

Let us sketch an outline of what such a regional scheme might look like. There would be small hospitals with full outpatient departments in the urban districts, and, outside these districts, in a green belt, large central hospitals providing accommodation and facilities for all specialties, and dealing only with acute sick in the same way as the existing voluntary hospitals do. Further afield, depending on geographical circumstances, there would be satellite hospitals dealing with tuberculosis, mental cases and those cases known as the chronic sick, and in each region there would be convalescent homes for children and adults. Let us see how the hospital patient of today would fit into such a scheme. A case of gall-stones or cancer would seek advice at an outpatient department and be seen by the appropriate consultant who would advise hospital treatment. The case would be admitted centrally and transferred to the large acute hospital to one of the consultant's beds in that hospital. After investigation and appropriate treatment the patient would be sent for convalescence, or if the condition was inoperable to his own home or to the satellite hospital for the chronic sick. With another, a patient with tuberculosis, the same procedure would be adopted; he would be sent for investigation and treatment to the larger hospital or direct to the satellite sanatorium. The acute case would be dealt with at the urban hospital, but the patient would be transferred to the periphery as soon as he was fit to travel.

At this point undoubtedly someone will say this is a state medical service; and at once sinister thoughts creep in about the curtailment of that liberty for which we are supposed to be fighting. I would agree that this would be a state service—a proper state service—but it would be no more than what the emergency medical service is attempting to be today with a free medical profession. Such a scheme has to be harnessed to finance, and it is here that the profession become nervous, believing that money means not so much control as interference. This need not necessarily be so. In the past the medical schools have been given large grants of money through their universities, but there has been no interference with the way individual schools have carried on their affairs. That the money granted has been expended in a proper manner is all the control that has been asked. These grants merely ensure that a broad general plan is followed. In the regional scheme outlined some similar system of linking finance might well obtain. It has already been suggested that the voluntary hospitals might have their resources pooled under a hospitals corporation, on similar lines to the B.B.C. Such a suggestion might go further by pooling all money that today goes to the hospital services, under a national medical corporation, or some such body.

In such a scheme surgery would play a large part and the surgeons of today should be asking themselves how they can improve the surgery of the future in any reconstruction that takes place. What constitutes a surgeon? Is he a man who goes out into a country district and calls himself a surgeon, or is he a man who takes a higher qualification in surgery? Broadly speaking, neither. The first may fail from lack of knowledge, the second from lack of judgment. He should be a man who in the opinion of his teachers has enough knowledge and experience to undertake surgery, who has served an apprenticeship in surgery. The carpenter and the cabinet-maker work in the same medium, yet the one requires a different apprenticeship from the other, and we expect a more finished class of work from the latter. We must ask ourselves, then, if these surgeons of the future should not have more experience under recognised teachers, after their final surgical examination, and before going out into the country under such a scheme. We are seeing almost daily men and women with wounds that seem as though they must cripple the patient for life, who yet recover almost full function. As surgeons we have also to inflict wounds in patients. We should see to it that we do not take advantage of this astonishing phenomenon of human recovery, but recognise it humbly as an aid to our art, and that we teach our assistants to treat it in the same way, so that when they leave us they go out with judgment and gentleness as good surgeons. For our part we must see that, whatever reconstruction takes place when peace comes, the individual character of British surgery—which is one of its greatest possessions—is maintained.

FURTHER AMENDMENTS TO THE B.P.

FURTHER alterations and amendments to the British Pharmacopœia have been effected by notice in the London, Edinburgh, Belfast and Dublin *Gazettes*. The items concerned are acetum, oxymel and tinctura scillæ, scilla, cataplasma kaolini, sodii lactas, tinctura valerianæ ammoniata, urginea, valeriana and valeriana indica. Hitherto the squill of the Pharmacopœia has been restricted to the bulb of *Urginea scilla*, the main source of supply of which was Sicily, and as that source has been closed Indian squill, the bulb of *Urginea indica*, is the subject of a new monograph and the monograph on squill has been amplified by the addition of the words "when squill is prescribed or demanded Indian squill may be dispensed or supplied." Facilities have been given to the importation of Indian squill which is now quoted in the London drug market. This variety of the drug is stated in the B.P.C. to be used in India and the Eastern Colonies in place of squill, and by amending the monographs on vinegar, oxymel and tincture of squill so as to permit the use of Indian squill in their preparation the Pharmacopœia is brought into line with Indian practice. The effect of the alteration in the monograph on kaolin poultice is to sanction the use of sodium lactate in place of glycerin in its manufacture, the object being to assist in the conservation of glycerin supplies. The monograph on valerian has been amended by the addition of the words "when valerian is prescribed or demanded, Indian valerian may be dispensed or supplied." As in the case of Indian squill, facilities have been given for the importation of Indian valerian, and in the preparation of ammoniated tincture of valerian. Indian valerian (*Valeriana wallichii*), which is indigenous to the Himalayas, is

admitted in place of *Valeriana officinalis* which can be collected in England from both wild and cultivated plants, but was formerly obtained in large quantities from Belgium and Holland. The opportunity has been taken to make a correction in the official dose of mepacrine hydrochloride; this should read: metric 0·05 to 0·1 gramme; imperial ¾ to 1½ grains.

While it is gratifying that India is able to supply this country with vegetable drugs which were formerly obtained mainly from countries which are temporarily closed to our trade, it seems curious that we should have to bring a commodity like valerian such a long distance overseas when all our domestic needs could be supplied in our own country if production, collection and distribution were carefully organised. It may be that by next autumn when the rhizomes of the plant cultivated in Derbyshire, Oxfordshire, West Suffolk and elsewhere in England are ready to be dug up there will be less need to use cargo space for a drug which grows under our very noses. Incidentally belladonna and dandelion root are also being imported from India in order to make up for the loss of imports from central Europe; what has been said about the home production of valerian applies almost equally to these.

THE STRETCHER PATIENT SECURED

A.R.P. workers sometimes need to lower a patient on a stretcher feet first by means of a rope fastened to the head of the stretcher and a guide rope pulling the foot end out from the wall; or to lower him by sliding the stretcher down a ladder; or to lower him horizontally from an improvised crane, with the chance that the stretcher will hit projections on the building and be tipped on one side or up at one end. Mr. H. F. Hodges, staff officer for stretcher parties, and Dr. E. B. Grogono, medical officer for civil defence, at Wanstead and Woodford, have devised a method of securing the patient to the stretcher by means of seven triangular bandages, and this is said to ensure that, whatever the position of the stretcher, the patient will not move more than 2 in. in any direction and that he will even remain in contact with the stretcher when face downwards.

The patient is blanketed (the Wanstead and Woodford method, officially approved,[1] is preferable), placed on the stretcher, and the bandages are then applied as shown in figs. 1 and 2. They are secured not by reef knots, which for this purpose are useless and dangerous, but by two round turns on the stretcher bar and two half hitches (fig. 3); this has the advantage of taking nearly all the strain off the knot itself. It does not matter whether the knots are tied as a clove-hitch or in opposite directions. Whether the head or the foot of the stretcher is raised nearly all the patient's weight is taken by the ankle bandages. The knee bandage prevents flexion at the knee, which would allow the patient to sag downwards, and the hip bandage steadies the pelvis. The crossed chest bandages give support if the stretcher is turned on its side and also take a little weight if the head is downwards. They can be fairly firmly applied and scarcely restrict breathing. The head bandage immobilises the skull comfortably and does not normally take much weight; it is especially useful if the patient has a head injury. Alternative methods have been devised for special injuries. For example, with leg injuries, two bandage slings are placed under the arms from the top bar of the stretcher (fig. 4); the pelvic bandage is used, but the weight-bearing ankle bandages are omitted or modified, and the legs are steadied on the stretcher by such means as the injuries allow. These methods have been approved by rescue personnel and are now being practised. With custom, the bandages can be applied very quickly.

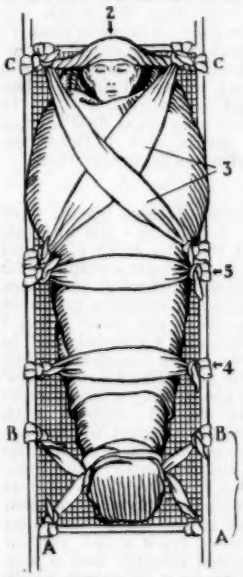


FIG. 1—The seven triangular bandages applied. Numbers indicate order of moves.

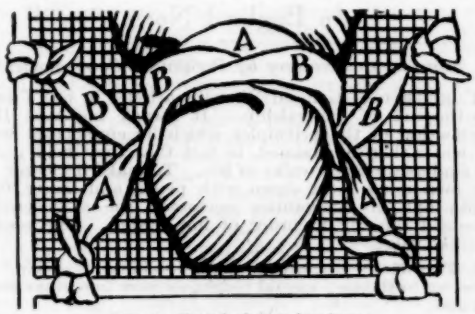


FIG. 2—Detail of foot bandages.

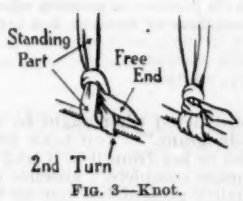


FIG. 3—Knot.

FIG. 4—Arm slings.

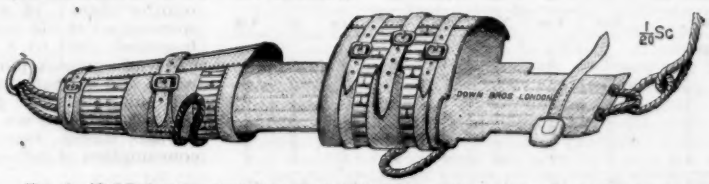


FIG. 5—Neil Robertson stretcher; used for hoisting patients from the holds of ships.

A ready-made stretcher intended to serve the same purposes, (the Neil Robertson hammock stretcher) is shown in fig. 5. It has proved valuable in the Navy for removing wounded men from turrets or storeholds, or even from ship to ship. The bands which enfold the patient are made of canvas, reinforced with bamboos or laths, and fasten with adjustable straps; the stretcher is thus compact, light and flexible. The patient can be carried by the hand grips at the sides, or slung from ropes at the head and feet.

1. See *Brit. med. J.* 1940, **2**, 638.

INDEX TO THE LANCET

VOL. II, 1940

The Index and title-page to Vol. II, 1940, which was completed with the issue of Dec. 28, is now ready. A copy will be sent gratis to subscribers on receipt of a post card addressed to the Manager of THE LANCET, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

In England Now

A Running Commentary by Peripatetic Correspondents

I'VE just read General Wavell's articles in the *Times* on the art of generalship. It struck me that the application of the principles which he enunciated was far wider than he claimed, in fact that they held good for leadership in all walks of life. To make it clearer in my own mind I sat down with pencil and paper and wrote out his "qualities necessary for a general," arranged roughly in order of importance. The result was like this :—

1. *Toughness.*—Robustness, even solidity; ability to stand up to shocks; mental toughness more important than physical.
2. *Courage.*—Determination, energy, the fighting spirit, the will to win; the spirit of adventure: "a touch of the gambler."
3. *Common sense.*—An ability to see what is and what is not practical or possible.
4. *Administrative ability.*—An ability to devolve responsibility, and to suit instructions to the capacity of one's subordinate.
5. *Natural qualities of leadership.*—Interest in, and knowledge of, humanity; the capacity to inspire the confidence, respect and appreciation of one's men, rather than their affection; firmness combined with justice; a position which is remote but not aloof; appreciation of humour, but little demonstration of it.
6. *Clarity of purpose.*
7. *Imagination.*—Adaptability, craftiness.
8. *Observation.*

With this as a basis, I constructed what ought to be called "the Wavell Psycho-biogram." You take any person you like and mark him or her from 0 to 3 under each of these headings: 0 means complete "absence of the quality"; 1 means "quality present but not up to general standard"; 2 means "present up to general standard"; and 3 means "maximal amount present" (Cæsar or Napoleon class). Maximal marks are 24; pass marks for a general or other leader position are 16; below that, "ploughed." Before I marked my subjects, I classified them as leaders or non-leaders, so as to test out whether theory and practice went hand in hand. Here is my table :—

Subject No.:	I	II	III	IV	V	VI	VII	VIII
Leader:	Yes	Yes	Yes	No	No	Yes	No	Yes
Quality:								
1	2	1	2	1	2	3	2	2
2	2	2	2	3	2	2	1	2
3	3	2	2	1	2	2	2	2
4	2	3	3	1	2	2	1	2
5	2	3	2	1	1	3	1	3
6	2	2	3	2	1	1	1	3
7	2	2	2	2	1	2	2	1
8	2	2	2	2	3	3	2	2
Total:	17	17	18	13	14	18	12	17

So it seems to work all right. All my subjects were outstanding people in their own line. I was a physiologist, II a schoolmaster, III a doctor, IV a social scientist, V an artist, VI an administrator, VII an engineer, and VIII a matron; IV, VI, and VIII were women. One day Wavell psycho-biograms may form an integral part of the work of army selection boards. Until we reach that enlightened age, however, I can strongly recommend them as a fire-side game for whiling away the blackout.

* * *

When I was a boy some aunt or other well-meaning person gave my brother for Xmas a little book called "Parables from Nature." I don't think any of us ever read it, it was considered the very essence of slop, and it became a family joke to secrete it among one of the others' luggage, especially when going back to school. Later when any of us went abroad it invariably found its way into his or her belongings, and I have been rendered suddenly, poignantly and hilariously homesick in mid-Pacific and in the Indian Ocean by coming across that little cream-coloured volume of Mrs. Gatty's, skilfully hidden in my whites. "Parables from Nature" must be one of the most travelled volumes in existence. Yet, when some weeks ago, Jan. 12 to be exact, I found glowing under a cowl of snow the radiant blossom of a winter aconite, and another one coming up, breech presentation, beside it, I felt impelled to write a parable from nature myself. For how does this little gem manage to extract nourishment and energy out of the frozen ground? The answer is, of course, it doesn't; it did all that last spring and summer, and stored it up in its nobbly corm. Thus and no otherwise should all those on whom the warring nation counts store up for themselves energy and health during the coming spring, summer and autumn. Cabinet ministers should don the shortest of shorts and run and bask on the Terrace, the majority of the Services will get plenty of sun and exercise in following their avocations, but munition workers, especially those youngsters who are just going into industry, should, if in any way possible, have their summer camp, or at any rate a series of week-end camps. Last year my own camp which normally takes about 600 boys each season did not have one; 600 fortnights of health staring lost, and that was going on all over the country. It will be unscientific folly of the worst kind if hiking and biking and camping are given up. They should be encouraged, even to the edge of compulsion. For consider the aconite, and remember that next winter may be the testing time of staying power.

Some weeks ago the upheaval of war brought a contemporary student at my old hospital and me together for a fortnight of close contact. During the 5 years we had been fellow students, as far as we could remember, we had never spoken to each other; in my mind was a dim memory of a slim figure with books under his arm, knowledgeable beyond the dreams of decency, who because he did not play games hardly intruded within my myopic range; his memory was of a rather noisy individual, definitely of the unintelligentsia. Of the 25 years since then he has been a psycho-analyst for 12, and for 4 years before that he was analysed himself, while for most of that time I have been scudding about the earth's surface more or less on my lawful occasions. We swopped yarns. I told him of my mild adventures in the Pacific, of that sorceress of cities, Istanbul, of treks in Australia, of China seas, only touching up the truth when it seemed irrelevant or disappointing. He beat me every time, he'd been much further afield. He told of a strange land where someone called Id held sway, where people went about seeking incestuous connexion with their parents or alternatively longing to murder them; of a strange sect that fell down and worshipped an old god, Fundament; of another country insecurely held by a supercilious dictator called Super-ego; of complex plots and stratagems, conducted in a weird and cabbalistic language; of horrid doings when this ruler slept; of taboos and castrations. . . . . In the last fortnight we have made up a good deal for our 5 years silence, especially at meals, but I think the consumption of salt on both sides has been abnormal.

* * *

Motives for joining the services, I have learnt, vary from unalloyed patriotism to frank self-interest. Orphaned by the last war and Irish by birth I abound in neither military virtues nor in patriotic sentiment for an English government, but the break through in France with Dunkirk and the first threat of invasion provided a sufficient stimulus for me to enter my name when I reached the end of a house-physician's appointment in London, and within a few weeks I was commissioned in the R.A.F.V.R. July found me attending the ten-days' course which converts civilian practitioners into service medical officers. During this time I listened with amusement to the squadron-leader detailed to instruct us in "service customs" and marvelled at the punctilio with which, judging from their supplementary questions, some of my companions proposed to conform; I listened at first with boredom but later with infectious enthusiasm to the officer who instructed us in the ways of making latrines so that no fly could get in, or, if it did, neither it nor its burrowing progeny could possibly find a way out; I listened with satisfaction to a discourse which reduced the prevention and treatment of venereal disease to the simplest proportions; I tried to sleep through

several periods allotted to a regular sergeant to instruct us in the use of service forms, but his barrack-square voice prevented me; and lastly, I listened first with wonder and then with admiration that my favourite subject—psychological medicine—should be dealt with in two periods described on the time-table as neurology and should yet be handled in a manner which left the impression of first-rate specialist knowledge combined with a practical, human point of view that I had not associated with service medicine. There was a glamour too about living in an officers' mess housed in an ex-Rothschild palace with a chandelier of a hundred lights hanging from the high roof of the hall. Solid gilt covered the richly moulded ceiling of the writing-room and food of magnificence and plenty undreamt of by any houseman was served in a panelled but still gilded dining-hall.

There were, of course, the difficulties and anxieties which I find inseparable from life among a large number of complete strangers, and there was the bogy of saluting. Whom to salute and when? And how, when confronted by a long column of men "eyes-lefting" you? All that seems funny now but at the time it seemed complicated and important. Few of the new officers there could refrain from comparing their feelings with those they had experienced as new boys at school. With age and experience we learn to control and conceal even from ourselves most of our childish reactions, but when, I wonder, if ever, do we really abandon them? From this training centre I went by ballot to a large recruiting depot. Recruits arrived there at the rate of 200–300 a day. They spent three days in the camp queueing; they queued up at different places all over the camp for clothes and forms and photographs and food and medical inspections and inoculations. These last fell to my lot. Every man on arrival at and departure from a station has to be "F.F.I.-ed" by an M.O.; that is, he is certified "free from infection." In large camps the procedure is highly organised; at this one the men were formed up, stripped to the waist, in a long queue. I sat on a chair two paces from the head of it, a corporal gave the order "Drop your slacks to your knees and put your hands upon your heads as you come up to the medical officer." An orderly stood where he could see each man's back while I ran my eyes alternately up and down their bodies—this sort of work teaches you economy of movement—noting with interest those of exceptional physique and wishing for the sake of tidiness to group them into their physical types. But how much more difficult it will become to treat people as individuals when civilisation reaches that degree of specialisation which requires only the appropriate physical type to be employed on each job: uniforms already render the recognition of individuals in a group less easy, but we do at least still have the tall and thin mixed up with the round and rosy.

Being ignorant of skins I usually had to learn from the airman the name and treatment of any of the unusual skin diseases I saw, but there were, I noticed, an unfortunately large number of men with, or severely scarred by, acne. Occasionally a man had to be kept till the end for more careful scrutiny of a possible scabies and I was disturbed by the thought that I might miss what, until a few weeks ago I had never seen—a case of pediculosis.

I have not yet been able to overcome the feeling that I owe an apology to these young airmen for lending to an examination of this sort the title "medical." The custom, I suppose, survives from the days when all common soldiers were presumed to be lousy until the contrary was proved, but, needless to say, among the self-respecting and intelligent young men recruited into the Air Force today any untreated skin disease is extremely rare. If one of these examinations made on changing stations should reveal unreported skin disease, it would be, I think, indicative of lack of confidence by the airmen in the medical service of the station concerned rather than neglect on their part.

The technique of mass inoculations was still more highly organised. As the most recently joined M.O. of a team of three I began by vaccinating while another gave the T.A.B. and the third the A.T.T. The men again filed through; this time as each passed the first orderly checked his name off a list, a second orderly cleaned his arm, and a third passed a sterile needle for each man to the M.O. who gave the first injection. The man, with the needle still hanging in his arm to save a double puncture, walked on to the second M.O. served by a fourth orderly who filled the syringes and returned the used needles to the steriliser. A fifth orderly flamed my vaccination needles and passed them to me with the end dipping in a phial of vaccine lymph, and as each man stepped up I had only to make one scratch "not exceeding ¼ in." and drop my needle mounted on its cork into a basin. The man passed on to a sixth orderly who applied a dressing to his arm. After the first parade my fingers and wrist ached, but I was proud of the speed and efficiency with which we had performed our task. I forget now the exact figure, but I think we had got through the whole parade at the rate of one man per 7 seconds whereas the "record" was only 5 seconds per man. It was not long, however, before my interest in whole men rather than their arms asserted itself; at first it was only an outstanding arm, one of magnificent girth or colour (for this was a summer of fine tanning), or, occasionally, of match-stick proportions which compelled me to look and see what manner of man it belonged to, but with even a single glance I fell behind with my work and before long I revolted at the system. These mechanised contacts between doctor and patient are bad for both, tending to weaken the bond of personal confidence which is needed if one is to see disease early and treat it effectively. The whole business reminded me of a modern factory I was once shown over in Denmark where the sides of bacon passed on an endless chain before a team of white-coated inspectors each of whom nonchalantly applied to its rind his appropriate stamp.

* * *

Correspondence on war neuroses had not prepared me for Mr. H. F. Buxton's story of his blasted horse, Idol, who seems to have behaved like an old-fashioned shell-shocker. After the bang, which just makes fourteen of his mates frightened and restless, Idol and another horse lie unconscious. The other recovers in two hours, but Idol is dead to the world till a humane killer is brought along, when he suddenly shivers and gets up, returning with some difficulty to light duty at the end of a week. Three months later comes another bombing, more severe this time, and Idol relapses in typical fashion; now he cannot back as a well-disciplined dray-horse ought, and finds difficulty in turning—interferences with voluntary movement which, in the human hysteric, would demand a search for purposive or symbolic elements in the depths of the unconscious, or, according to another school, would be dealt with by firmer methods. But Idol cannot free associate for the psycho-analyst, nor does he present pants that can be kicked; so more time-honoured, if temporising, methods are used and he is promised a nice holiday in the country as soon as the fine weather comes. Have human communications so corrupted his good manners that Idol seeks the secondary gain from illness and perpetuates symptoms that should be evanescent, or after all were the older pathologies true that rested on separated synapses and punctiform hæmorrhages as causes of apparently hysterical symptoms? How, too, should the humble clinician classify Mr. Buxton's blasted cows, whose dreamy placidity and anorexia doomed them to slaughter? It is all very confusing.

* * *

All morning I was behind schedule. Various foreigners (by which we mean all those unfortunates who have not lived in this neighbourhood for at least 10 years) strolled late into the surgery for long consultations explaining cheerfully that they thought surgery hour was from 9.30 to 10.30 instead of from 9 to 10. The result was that I started late on my long morning round knowing that I had to be back at all costs for a series of appointments starting punctually at 2.30 P.M. On these occasions I refuse to look at my watch, for if I do I get fussed, but I am not above taking a sidelong glance at the clocks in patients' houses, always fondly hoping that they may be fast. Still with several visits to do and wondering just how late I was I reached a house about 6 miles from home. There was no clock on view as I proceeded upstairs to my patient's bedroom. Downstairs, six "pips" sounded. The one o'clock time signal. No lunch today,

I thought, and groaned inwardly. Outwardly dissembling, however, as best I might, I listened to my patient's troubles and began to examine him. Downstairs another six "pips" went off. H'm, rather surprising. You don't usually get two time-signals at a few minutes' interval like that. Odd. What was odder was that neither time-signal had been followed by the low, muttering delirium of the announcer reading the news. I finished my consultation, took leave of my patient and turned to go downstairs. Curiouser and curiouser—another time-signal. Could the BBC have gone off its respectable rocker or the Narzees be monkeying about with our sacred G.M.T. ? I could make nothing of it. Stepping into the drawing-room to discuss the patient's case with his wife I noted to my relief that it was only 12.15 by the clock which, I was assured, was right. Incidentally the mystery of the time-signals was solved. People ought not to keep parrots in places where they can hear the wireless.

MEDICINE AND THE LAW

Unjustifiable Deduction by Insurance Committee

THE success of Dr. H. Tudor Edmunds of Slough in suing the Bucks Insurance Committee raises a point of general interest to the profession. He had formerly treated a patient who is the manager of a firm trading as Scott and Bowne. The firm had been "evacuated" to a place about 3½ miles from the doctor's own home and outside the district in which he usually practised. A year ago the manager, aware of his skill, asked him by telephone to come and see two women employees of the firm who were ill. He attended them and, two days later, also attended another woman employed there. Dr. Tudor Edmunds entered the attendances in his day-book as one item debited to Messrs. Scott and Bowne. Nothing was said at the time about their being insured persons. He made the visits at the request of the manager. He sent in his account to the firm for £4 0*s.* 6*d.* ; when asked to give particulars of the amount charged in respect of each of the three patients, inasmuch as two of them were insured persons, he did so. The case of the two insured patients was afterwards taken up by the firm with the insurance committee. Dr. Edmunds is himself on the list of insurance practitioners for the county of Bucks and has some 900 panel patients. The insurance committee, without hearing his side of the matter, deducted £3 13*s.* (in respect of his charges for the two insured patients) from the money otherwise admittedly due to him. Having in effect been fined £3 13*s.*, he claimed this sum in the Windsor County Court on Feb. 4.

His Honour Judge Cotes-Preedy had no doubt that the manager of Messrs. Scott and Bowne had asked Dr. Tudor Edmunds to go and exercise his medical skill ; he exercised it, and nothing was said about any patient being on the panel until some weeks later. The contract was not between the doctor and the insurance committee but between the doctor and the patients' firm. The insured persons did not pay the fee ; the insured persons, therefore, could not recover the money or ask the insurance committee to refund it. The deduction could not be made under the regulations. The court gave judgment for the plaintiff with costs on the highest scale, the case being considered as one of importance to the medical profession and to insurance bodies.

Dr. Edmunds, whose claim was undertaken by the Medical Defence Union, has vindicated a point of principle. He visited the firm's employees as a private doctor, not as a panel doctor. Had he known that they were panel patients, he would doubtless have given them the name of another practitioner in that district. Doctors are often called in by firms to deal with employees in similar circumstances because it is found more convenient to have the services of one practitioner than a dozen. The Bucks insurance committee contended at one point that, as it was a semi-judicial body, the judge had no jurisdiction in the case, the matter being covered by the medical benefit regulations. His Honour drily observed that, if the defendant committee set itself up to be a judicial body, its conduct was singularly unjudicial. *Audi alteram partem*, indeed, is a fundamental rule of natural justice. Recent examinations of the functions of administrative tribunals have repeatedly emphasised that a man must not be condemned unheard. This is an ancient principle. As a judge quaintly remarked in a bygone century, God did not even expel Adam from Eden without first calling upon him for an explanation.

Appeal of Pharmacist against Erasure

The first appeal from a decision of the statutory committee of the Pharmaceutical Society in accordance with the provision of the Pharmacy and Poisons Act, 1933, was heard on Feb. 13 and 14 by a King's Bench divisional court consisting of the Lord Chief Justice (Viscount Caldecote), and Mr. Justice Humphreys. The appeal was brought by Mr. Barry Lawson, whose name the statutory committee had directed should be removed from the register of pharmacists (THE LANCET, May 11, 1940, p. 907) on the grounds that he had been guilty of misconduct in distributing to the public by post and without invitation or request a printed pamphlet of an objectionable or indecent nature. The pamphlet advertised drugs which were described as "Hormonal treatment for impotence and nervous debility in men and frigidity and apathy in women." The court decided to dismiss the appeal, the Lord Chief Justice observing that there were some parts of the pamphlet that appeared to go so far beyond a mere medical or scientific advertisement that it was not surprising that somebody thought it should be made the subject of a complaint to the Pharmaceutical Society. Mr. Justice Humphreys observed that the pamphlet "has not the remotest claim to be considered a medical advertisement. It is a mere catch-penny document designed to induce unwary persons to pay most preposterous prices for the drugs which are there advertised." The decision of the High Court is interesting in that the action of the statutory committee which it upheld was the first occasion on which disciplinary action had been taken against a pharmacist contravening the provisions in the "Statement upon matters of prof ssional conduct" which was issued by the council of the Pharmaceutical Society in April, 1939. The statement was issued for the guidance of pharmacists and corporate bodies carrying on business under the Pharmacy Acts and one of its recommendations was that advertisements of medicines should not be issued to the public referring to sexual weakness. The Pharmacy and Poisons Act, 1933, provides that the names of persons whose appeal to the High Court has been dismissed may not be restored to the register by the statutory committee except with the approval of the Privy Council.

SUPPLEMENT TO THE U.S. DISPENSATORY

FOR the first time in its 107 years' history the United States Dispensatory possesses a supplement, and a very useful one it is. The supplement to the 22nd edition (London : J. B. Lippincott Company. Pp. 76. 5*s.*) supplies notes on all the new drugs and preparations included in the two supplements to the U.S.P.XI and the First Addendum to the British Pharmacopœia, 1932. There are monographs on ascorbic, mandelic and nicotinic acids ; adrenergic drugs, including epinine, amphetamine (benzedrine) and veritol ; azochloriamide, heparin, magnesium trisilicate, mecholyl, stilbœstrol, soluble pentobarbital, pentothal and vitamins E, K, and P. Riboflavin (B_2) and adermin (B_6) are discussed in addition to thiamine hydrochloride (B_1), but aneurine hydrochloride, the name used in the Third Addendum to the B.P. 1932, is unfortunately omitted from the list of synonyms for vitamin B_1. Sulphanilamide and its congeners, sulphapyridine and sulphathiazole, receive attention, and the supplement says that sulphapyridine "is generally regarded as inferior to sulphanilamide in streptococcus and meningococcus infections, but it is the universal consensus among those who have employed it that it is superior in the treatment of pneumonia." How many practitioners in this country realise this and in how many cases could sulphanilamide be prescribed instead of the more costly sulphapyridine ? Too many think that sulphapyridine is more effective than sulphanilamide in the treatment of *all* infections.

Letters to the Editor

TREATMENT OF HYPERTOXIC DIPHTHERIA

SIR,—I read with much interest the papers by O'Meara and McSweeney and your leading article of Feb. 15. The belief of the Dublin workers that the diphtheria bacillus in the body produces two factors, A and B, and that the ordinary commercial serum, while effective against A, is relatively unsuccessful against B, encourages me to give my experience in the treatment of hypertoxic cases of diphtheria with commercial serum plus a blood-transfusion from a suitable adult donor. The treatment is based on the theory that the average adult is immune to the type of diphtheria prevalent in his district. The adult's blood contains antibodies which are specific for the *disease* and not just for one factor of it. Certain antibodies are present which are only available in very small quantities in commercial antitoxin. A combination of commercial antitoxin plus the antibodies present in a suitable local adult's blood should contain all the antibodies required for treatment of a local patient. A transfusion from such an adult would also benefit the patient by adding healthy blood to his own and di uting the circulating toxin. The very severe cases are given 60,000 units of commercial antitoxin intramuscularly and a similar quantity intravenously. The blood for the transfusion is preferably taken from the pooled blood of many donors rather than one. This blood can be got by arrangement from a local blood bank. It is advisable to dissect down on the vein and tie in a cannula. The blood is not heated and is given by the drip method. The average quantity injected is a pint, but this depends on age and so on. The results are very satisfactory and an improvement is noted very quickly in the patient. The cases so far treated have shown none of the complications usually associated with the hypertoxic type of diphtheria. I suggest that, since the serum mentioned in O'Meara's and McSweeney's articles is not yet available commercially, ordinary commercial antitoxin and a transfusion of whole blood be used instead.

Public Health Dept., Gorseinon, Swansea. G. E. DONOVAN.

POST-WAR HOSPITAL POLICY

SIR,—Mr. Somerville Hastings writes with much devoted experience and sincerity; but attention should be drawn to the concluding paragraph of his letter where he says: "It is the people of this country who use the hospitals. It is the people who must control them, through their national and local representatives." Does he mean local authorities, elected often on a 30 per cent. poll for many qualities and policies, mostly far removed from hospital experience? Or does he mean Parliament, elected on a party vote, which has little or nothing to do with hospitals? My own experience, as a county M.O.H. for 16 years and as M.P. for 21, urges me to submit that such a suggestion means hospital management by a bureaucracy, however able and honest, but little representative of the people; and that what the people want is hospitals and staff that have their confidence, usually as a result of long tradition and self-sacrificing work of those who run them and support them.

This is the hospital problem before us, not to be met by any cut-and-dried system of mere municipalism or voluntaryism, but by a wise combination of the best qualities of both systems.

Hatfield. FRANCIS FREMANTLE.

TREATMENT OF WAR NEUROSIS

SIR,—It seems to me that the revival of the old controversy left over from the last war between the "get-them-fit-quick" and the "slow-but-sure" schools, may be left to settle itself in practice, since it all depends on the type of personality, the type of neurotic reaction, and the time at which the case receives efficient treatment, not to mention the kind of therapist.

Dr. Slater and his colleagues stressed the importance of facing the problem of "boarding category" as soon as possible, and of re-adapting the neurotic soldier for re-entry into a useful civilian life. My experience has been mainly with soldiers discharged from army life for neurosis, after having had, or more often not had, suitable treatment. They are certainly not re-adapted, and have managed to come in the way of further psychological treatment more by luck than good management. Surely, here is a question that should be tackled at once, before we have an army of civilian neurotics clamouring for pensions. Is there any reason (except the spurious one of saving money) why these men should not be kept on at E.M.S. hospitals, as civilians, until as much as is possible has been done for them, instead of being hustled out into a difficult world soon after being boarded?

There is a golden opportunity, not only now but after the war, to procure for cases of neurosis suitable residential treatment, which has never before been possible. It will only be by lack of vision that this will be lost, and we shall once more be left with recrimination and muddle.

Birmingham. CHARLES BURNS.

CHEMOTHERAPY OF CEREBROSPINAL FEVER

SIR,—Dr. P. H. Willcox and Dr. G. Cutts criticise (*Lancet*, Feb. 8, p. 194) my dosage of 9 g. daily of the sulphonamide drugs in cerebrospinal fever during the initial period of 2–3 days. They have apparently had complete success with 6 g. daily of sulphapyridine in the few cases which they have treated. This I can believe, but suggest that a larger experience of this dosage will occasionally lead to disappointment. They state that I "consider that two days' treatment with sulphapyridine should be enough to eradicate the disease." They will find no such assertion in my paper, explicit or implied. Perhaps they refer to my statement that meningococci were never found in the cerebrospinal fluid after 2½ days of sulphathiazole in standard dosage (9 g. daily for an adult). From my earlier papers they will see that in 1938–39 29 out of 30 bacteriologically verified cases treated with this dosage of sulphanilamide had the cerebrospinal fluid free from organisms within 48 hours, and the same was true of 33 out of 34 cases treated with sulphapyridine. In the epidemic period of 1940, out of 120 cases (80% bacteriologically verified) apparent sterilisation of the fluid was delayed beyond 48 hours in only 1%. But no-one should infer that the disease has at that stage been eradicated, or limit the duration of chemotherapy in this disease to two days. It is obvious that the more rapidly the C.S.F. is sterilised the less will be the liability to relapses and sequelæ, and the more certain the cure. I have seen several cases in which the lower dosage did not render the C.S.F. free from organisms so rapidly, and indeed, with sulphanilamide, led to apparent drug fastness of the organism. In infants I have seen and been informed of a considerable number of avoidable deaths where a low initial dosage of sulphapyridine (1 g. daily) was used. Why take the risk with the lower dosage when the higher has been proved to be not only effective but safe?

In view of the low case-fatality which I recorded in my series, Dr. J. M. Kennedy (*Lancet*, Feb. 15, p. 231) asks for an explanation of the Registrar-General's weekly returns for London which, in 1940, showed 868 notifications and 158 deaths (fatality 18%). In contrast with this I had 234 verified cases treated during 1940 with 14 verified deaths (fatality 6%). If my cases are excluded from the London figures, the apparent fatality for the rest of London would appear to be considerably higher than 18%. I raised the same point in connexion with the statistics for the first quarter at a meeting of the Royal Society of Medicine in May, 1940. I was informed that these notifications and deaths did not necessarily refer to the same people, since, for example, cases might be treated in London hospitals which were notified elsewhere, and further that the figures were subject to correction in respect of altered diagnosis. It would probably be fallacious to consider the Registrar-General's weekly returns in the London district as anything more than a rough guide to the true fatality-rate of cerebrospinal fever. In this connexion I was puzzled by Dr. Kennedy's statement that the weekly returns showed 235 notifications for Sheffield (with 46 deaths) and that he treated 235 Sheffield cases in his hospital. Does this mean that in no case was the diagnosis altered after admission to hospital? In 1940, 17% of cases certified as cerebrospinal fever on admission to this hospital had the diagnosis corrected; and a much smaller proportion admitted as pneumonia, enteritis, &c. were found to be

suffering from cerebrospinal fever. In contrast with the *discrepancy* between the fatality in my hospital cases and the apparent fatality shown in weekly returns for London, Dr. Kennedy shows a *similarity* between the fatality in his hospital cases (22% in 314 cases) and the apparent fatality in the weekly returns for Sheffield (19·6% in 235 cases). He suggests that, as some of my cases were first seen at, or admitted to, L.C.C. general hospitals they form a selected group not containing the fulminating type of case, and asks how many of my cases were sent on from general hospitals. The answer is 144 or 61%; more than two-thirds of these were transferred from the receiving room of the general hospital without being admitted to the wards, and nearly all the remainder were transferred on the morning after admission. Fulminating cases were found to be readily transferable. I have classified as severe, or very severe, 89 or 38% of the whole series. Dr. Kennedy mentions that 35 of his 70 deaths occurred within 24 hours of admission; but, similarly, in my series 6 of the 14 deaths occurred within 24 hours of admission, and 7 were from general hospitals and 7 from home. Dr. Kennedy also asks the number of deaths which took place at the other London hospitals before patients could be transferred. This information is unobtainable at short notice but I have ascertained that the distribution of 157 registered deaths in London during 1940 were: L.C.C. fever hospitals, 64; L.C.C. general hospitals, 50; other hospitals, 38; private addresses 5. I do not yet know the distribution of the 50 deaths among the L.C.C. general hospitals, nor what proportion of them represent fulminating cases, nor the total number of cases admitted to the general hospitals. It is possible, however, that some of them might have raised the mortality in my series had they been admitted direct to Park Hospital.

As far as I can judge, there are other factors concerned in my low fatality-rates. One is the verification of all deaths post mortem by a pathologist. No less than 16 deaths in cases admitted as cerebrospinal fever were due to tuberculous or Pfeiffer meningitis, cerebral abscess, tumour, hæmorrhage or ulcerative endocarditis. Diagnosis altered in the P.M. room does not always appear in the death certificate. In this way, probably 16 deaths instead of the true figure of 14 appeared in the Registrar-General's returns in respect of my series.

Apart from the question of dosage, the following factors are, in my opinion, important in treatment and should be applied immediately on admission, since delay may be fatal: intravenous sulphapyridine or sulphathiazole in every severe acute case; tube-feeding in comatose cases night and day in the first 48 hours if necessary; parenteral fluid if there is much vomiting or dehydration; the general use of sulphathiazole in preference to sulphapyridine because it rarely causes vomiting and dehydration, and may, besides, be a more potent drug. All this means that experienced medical and nursing assistance must be available for every case admitted even at such awkward times as the middle of the night, Saturday afternoons, Sundays and bank holidays. That is why, in my opinion, the treatment of cerebrospinal fever in an organised unit for each district is likely to yield the best results.

Park Hospital. H. STANLEY BANKS.

SIR,—I was glad to see the letter of Dr. Willcox and Dr. Cutts in your issue of Feb. 8 dealing with Dr. Banks's remarks on the dosage of sulphapyridine in cerebrospinal fever. Indeed, before I read it I had a letter prepared for you pointing out the false deduction as to the cause of the relapse in Dr. Banks's case 1. May it not be that the improvement in his cases after transfer to the Park Hospital was due to factors other than increased dosage? We have had similar experiences with the lower dosage. Adequate fluid intake, for example, is one of the most important factors in successful treatment and this is probably achieved most successfully in a good infectious-diseases hospital. The numbers in Hastings have been small, but have included some very severe cases, and, although we have noted the unsatisfactory results of low dosage, we have had reason to be satisfied with the "pneumonia dosage" of sulphapyridine, supplemented in a few cases by 1 g. of the sodium salt intramuscularly on the first day. Since the introduction of sulphapyridine, 22 cases have been treated with no fatality or permanent complication except a doubtful cardiac lesion in an airman who, however, was later passed for full flying duties. We are therefore disinclined to increase our dosage without good reason and would welcome further discussion of the subject. Dr. Kennedy's letter of Feb. 15, quoting a mortality of 22% in 235 Sheffield cases, treated by dosage even higher than that recommended by Dr. Banks, gives further ground for reviewing this subject. In connexion with Dr. Kennedy's final point, I would add that the 22 cases referred to in this letter include all the cases (18) notified within the borough; 4 cases were admitted from surrounding areas.

Health Department, Hastings. K. J. GRANT.

HIGH BLOOD-PRESSURE

SIR,—I have just read three articles on high blood-pressure which doubtless summarise the latest knowledge we possess. In 1912—quite frankly, to my surprise—I was fortunate enough to be awarded the medal of the Hunterian Society for my essay on this subject. After having read these articles I looked up the original essay; I had forgotten much of what it contained. To my surprise I found that the articles contained practically nothing more than I had written 30 years ago. Regarding ætiology, management of a case, apparatus and treatment I found nothing new except mention of the xanthine derivatives. In a limited—a very limited—sphere these preparations have been "useful"; I think this is about all one can say of them. A few other drugs and forms of treatment, not known in 1912, are mentioned in the articles and are almost all turned down as having given "disappointing results," which is perfectly true. It is, to me, a sad reflection that a subject so important as this should have been at a standstill for so many years, and this in spite of the enormous amount of literature surrounding it.

Upper Harley Street, N.W.1. A. GRAHAM-STEWART.

SUPPORT FROM THE U.S.A.

SIR,—The subjoined extract is taken from a letter written by a surgeon in the U.S.A. on Jan. 7, when the Lease-and-Lend Bill was in its infancy. It indicates how widespread at that time was the desire to help Britain to the utmost.

"You—I mean England—are having enough trouble. We are going to do everything to see that England does not fall. To you it may seem slow. A few months more will make a difference that even you will not believe. You will read of opposition but it is a small minority—but vociferous."

London, W.1. ARNOLD LAWSON.

CRAMP AND THE ILIO-TIBIAL BAND

SIR,—After reading your annotation of Dec. 28 (p. 816) I thought the following record might be of interest.

A middle-aged lady, who had been severely injured in a motor accident, was advised to seek my advice for very severe so-called sciatica. Examination showed that the ilio-tibial band was so sore and inflamed that, with her doctor's consent, I told the patient that I thought the only thing to do was to divide it, following Ober's technique. The patient inquired what it would involve, and I replied a week in bed and then gradually getting up during the next week, that is a fortnight in the home all told. We were somewhat disconcerted when the patient said that she considered the proposal quite impossible, because, far from being able to stay in bed for a week, she had never been able to do so for as much as two hours for the last eighteen months on account of cramp. Still I had nothing else to suggest and reluctantly the patient consented. From the moment the band was divided the cramp entirely disappeared, and I am thankful to say it has not recurred since. The operation was performed over two years ago.

Of course, nothing can be claimed from a single case, and it is not the general practice to refer patients with cramp as the main symptom to the physical-therapy department. Knowing, however, the technique for examining the elasticity of the band, and knowing also the widespread symptoms that can be attributed solely to the loss of elasticity in it, it seems that this might be

a fruitful field for investigation. Fortunately we seldom fail to restore adequate elasticity without having to resort to operation, though often enough it means hard work and always involves the coöperation of the patient.

Regent's Park, N.W.1. JAMES MENNELL.

POLYRADICULITIS

SIR,—I was much interested in Dr. H. S. Barber's account (*Lancet*, Nov. 2, 1940, p. 548) of seven cases of acute polyradiculoneuritis seen by him in East Anglia during the winter 1939–40. Similar cases had been observed by me in Sunderland at about the same period and are still occurring; all have been sent in either as diphtheria or as throats requiring hospital treatment. The symptoms observed by me fit in with the typical syndrome discussed by Dr. Barber and I have no doubt that such cases were widespread. For the last two years or so there have been many cases admitted to hospital as diphtheria which were not diphtheria and this had made me wonder whether diphtheria is as prevalent as the notifications suggest. Many of my cases are of tonsillitis, of mixed infection, and of course they cannot be avoided by immunisation against diphtheria. Corrected figures from the larger hospitals might be revealing. The increase of throat affections is to my mind due in great part to the blackout and congregation in shelters.

EUSTACE THORP.

Hospital for Infectious Diseases, Sunderland.

PREVENTION OF DIABETES

SIR,—For several weeks a discussion on this subject has been going on in your columns and I can no longer refrain from a few candid remarks. After all, carbohydrate metabolism is such a complicated subject that disagreements are inevitable and a desirable sign of health and progress in ideas. The main point under discussion is whether high carbohydrate diets place a strain on the pancreas (Best et al. and Young) or prevent diabetes (Himsworth). Experimental work shows that in partially pancreatectomised animals (Allen) and in pituitary-diabetic animals (Young; Best and others) carbohydrate food "strains the islets" and produces diabetes, and I am certain that continuous hyperglycæmia usually makes human diabetes worse. Himsworth believes that high carbohydrate diet in normal animals and men not only does not strain the pancreas but prevents the onset of diabetes; but normals have such an insulin reserve that hyperglycæmia is never produced and I do not see how their reactions are directly pertinent to an argument on diabetes. As far as I know, a fundamental experiment has not been carried out. I should like to see normal dogs transfused for 1–2 weeks with sufficient glucose to maintain a constant hyperglycæmia. Whether this per se does or does not reduce pancreatic insulin and produce β-cell changes is an experiment which would clarify the problem under discussion.

Professor Himsworth admits in his letter of Feb. 1 "that in diabetic animals whose disease is not controlled by insulin .... excessive amounts of carbohydrate probably exhaust the remaining insulin-producing tissue" (the word "excessive," to mean anything tangible, requires definition). Now I personally have rarely been able with insulin to "control" human diabetes in the full sense of making the metabolism and blood-sugar normal, and so think that most of my cases (and probably his) can be made worse by excess of carbohydrate. For this and other reasons I have seldom used really high carbohydrate diets, except in total diabetics who cannot be made worse. I feel that Professor Himsworth's advocacy of high carbohydrate diets (which I think has had a most beneficial effect on the treatment of absolute diabetics in this country) is no longer on such clear theoretical grounds as before and requires clarification; so too does his position on "insulin kinase" from the liver. This is still mentioned, and discussed, and, if he no longer believes in it, a definite statement would be welcome.

Professor Best and his colleagues (*New Engl. J. Med.* 1940, **225**, 611) make the tentative suggestion that children suspected as likely to develop diabetes from their heredity, and presumably also from showing slight hyperglycæmia, should be subjected to preventive treatment consisting of low C. diets and small prophylactic doses of insulin. Professor Himsworth objects to this as likely (low C. diets) to produce diabetes but I protest on other grounds. In the first place I think the hereditary theory they quote (Pincus and White, *Amer. J. med. Sci.* 1933, **186**, 1) quite unproven. In the second place the life of the children under such experimental observation would be really appalling—a distressingly abnormal diet and the certainty of hypoglycæmia from the smallest doses of insulin. The hypothetical prevention (and there is no possible control in such an experiment) would be worse than having diabetes itself, where, in children, a reasonably normal diet is always prescribed as a necessity. I hardly feel the suggestion can be taken seriously and do not think "the goal justifies the endeavour." Dogs, yes: children, no.

R. D. LAWRENCE.

Diabetic Clinic, King's College Hospital.

Parliament

Making the best of our Rations

FROM the medical point of view the House of Lords has been the chief centre of interest during the past week. Viscount BLEDISLOE, an authority on agriculture, asked the Government if they were satisfied that during the current year there would be enough essential foods to provide for our civilian population, our fighting forces, and our (indispensable) farm animals; and whether there were any particular foodstuffs increased production of which in this country was both desirable and practicable. The country, said Lord Bledisloe, ought to be told what foods were essential for health and nutrition, and to what extent enemy action would prevent supplies of them coming from overseas.—Lord DAWSON of PENN reminded their lordships that this was the first totalitarian war, and as civilians were contributing a larger measure to the fighting than on previous occasions a nearer equation was necessary between food granted to the forces and to those in civil life. In the light of the evidence, which he regarded as overwhelming, that surplus food in the Army was being wasted he pleaded for a review of army rations. Viewing the matter broadly, however, he thought that the nation had suffered precious little dislocation of its life under the system of rationing. Up till now there was nothing to show that malnutrition had resulted; on the contrary, the young, who mattered most, were in good health and colour and just as alive with energy and laughter as in times of peace. On the other hand, certain sections of the adult population had suffered a reduction of weight. While Lord Dawson felt that this was not a matter of immediate moment, he emphasised the need for keeping a constant watch on national nutrition from every angle, particularly since we had to set the course to prepare for another winter. Notwithstanding the strong habit of meat-eating which has been inherited by the British people Lord Dawson asserted that the nation would suffer no harm from the curtailment of its meat supplies so long as it had access to certain essential foods. Meat, it was true, was a valuable article of food, because it was a source of first-class protein and because it was appetising, stimulating and satisfying. But the general public were gradually realising that they could keep healthy while eating much less meat than formerly. Evidence of this was the fact that in the last 25 years we had come to buy 50% more milk, 64% more vegetables and 88% more fruit. Lord Dawson went so far as to say that the present rationing would benefit the habits of our people after the war was over. Among the essential foods to which the population should have access were wholemeal bread, milk, cheese, potatoes, carrots, leaf vegetables and fruit. The basic nutritional value was impossible without an adequate supply of vitamins. It was known from the records in this country of rickets, beriberi and scurvy that the risk of these diseases had been removed by small quantities of vitamins. That was one of the reasons why milk must be given pride of place. It was the complete food, for it contained not only fats, protein and carbohydrate in assimilable quantities but also vitamins and equally essential minerals like iron, calcium and phosphorus. Experiments in England with the Oslo breakfast had

demonstrated what a large part the ingredients of that breakfast—wholemeal bread, milk, butter or vitaminised margarine, cheese, salad and fruit—played in our diet; if we could have those kinds of food we might say all other things would be added unto us. Lord Dawson urged the Ministry of Agriculture to take every step possible to secure greater milk production. But milk was needed immediately, and to augment the liquid supply Lord Dawson advocated the importation of powdered whole milk and powdered skim milk to our full capacity. He also suggested the importation of vegetable protein in the form of powder. Cheese was an invaluable food and undoubtedly its present absence from our dietary was a serious loss. If it could possibly be avoided he thought that our people should not be deprived both of meat and cheese at the same time. He congratulated the Government on the approaching accouchement of the standard wholemeal loaf. "Let our people have bread and milk and potatoes, and a moderate amount of protein food," he said in conclusion, "and I am sure that all will go well."

Lord WOOLTON, Minister of Food, made no attempt to hide the probability of still further food restrictions. It was impossible, he said, for us, or any nation, to wage war and live to the standard to which we had grown accustomed. We would have to go back to the days of simpler living. The bread supplies of the country were ample and cheap, and the price was substantially unchanged from the pre-war price. He had been fortified in his bread policy by much scientific advice. Our greatest weakness was in the animal protein group—bacon, eggs, cheese and meat. He expressed great concern about the shortage of some of those commodities, particularly cheese. So long as the Mediterranean campaign went on he saw no possibility of increasing the meat ration from its present figure. He had been greatly encouraged by the views on meat which Lord Dawson had given to the House. Meat was not indispensable and we had potatoes and vegetables and oils. We also had milk and with these things surely we could get all the energy and health that we needed. So far as supplies of animal feeding stuffs were available he intended to see that they were used for the maintenance first and foremost of our dairy herds. He was trying to work out a plan to secure that the available supplies of cheese went to the people who needed it in their work. Months ago he had arranged for the importation of all the powdered and skimmed milk which we could get from overseas. We were holding in this country powdered milk so that in an emergency milk would still be available for the public, particularly for children and those in the hospitals. He hoped that it would not be long before something was done to reduce the demand made by the armed forces on our food-supplies.

State Subsidised Food

Another debate in the House of Lords affecting national health was raised last week by Viscount ASTOR, who asked the Government whether they intended to develop the policy of subsidising meals, especially for pregnant women and for children, in order to improve the physique, health and mental development of the rising generation and to economise foodstuffs. He pointed to the decline in the consumption of milk under the cheap milk in schools scheme from 2¼ million gallons in October, 1938, to 1¼ million gallons in October, 1939, and said that this serious state of affairs was likely to prejudice the welfare of a considerable number of children. In about half of the local education authority areas in England and Wales no provision was made for free meals for necessitous under-nourished children and in many areas where such provision was made it was insufficient. While making due allowances for the difficulties which now faced local authorities Lord Astor contended that many of them have not done as much as they could in this important matter. He admitted that under the circular which came into operation last July an enormous contribution had been made to the physical welfare of children at an age when their feeding was of primary importance. But he urged that the benefits of this milk scheme (by which any child up to the age of five years where the family income does not exceed 40*s*. a week is entitled to a pint of milk a day) should be extended to include children over the age of five. He also hoped that the principle which had been adopted by this milk scheme would be continued after the war was over.

Lord WOOLTON said he had spent a great deal of his time and energy in establishing clinics and trying to persuade education authorities to provide meals and milk for necessitous slum children in Liverpool. It was true, as Lord Astor had said, that the consumption of milk in schools had dropped by a million gallons, but the total increase in the consumption of milk by the population as a whole had increased by five million gallons a month. Most important of all, the consumption of milk by people who were recognised as having prior necessity had risen to ten million gallons a month. We were now drinking, and were likely to continue to drink, all the milk that the agricultural industry could provide. Indeed, he was fearful lest the industry might be unable to provide all the milk which the people were being taught to drink. The number of local authorities who were now making this provision had increased from 200 to over 250 but the President of the Board of Education was pressing on still further. The Government fully recognised that now that women were being drawn into factories there would be more need for meals in schools. For that and other reasons he had taken active steps to secure that there should be communal feeding centres throughout the country.

QUESTION TIME

R.A.M.C. Training

Lord DAVIES asked the Government whether they would consider the desirability of providing units of the R.A.M.C. now stationed in country districts with facilities for practical training by arranging for them to be drafted in suitable instances to urban areas which had suffered or were likely to suffer heavy casualties as a result of enemy action in order that they might assist the first-aid and hospital services in their district.—Lord CROFT, under secretary of state for war, replied that the Government were willing to provide facilities for the training of the R.A.M.C. units in urban areas or to assist hospital services in that district where this did not interfere with unit training in military formations and the military commanders agreed that the units could be detached for the assistance of civil authorities.

Allocation of Doctors

Sir FRANCIS FREMANTLE asked the Minister of Health what steps he proposed to take to decide the respective priority of needs of medical practitioners between those of the civil population, of local authorities and of the fighting services.—Mr. E. BROWN replied: The questions of priority referred to by my hon. friend have already been considered by the committee on the allocation of medical man-power and action is being taken on their recommendations. I am considering with the other ministers concerned what organisation should be set up to deal with similar questions that may arise in future.

Dr. H. B. MORGAN asked the Minister whether he was aware that disquiet existed by reason of many doctors under 45 years of age being appointed to reception areas at the instance of local medical war committees or the Central Medical War Committee; and would he investigate the position having regard to the needs of the armed forces for doctors and to the fact that many doctors, either with greater domestic responsibilities or more advanced in years, were available for professional work in reception areas.—Mr. BROWN replied: I am informed that most of the doctors transferred from vulnerable areas to reception areas at the instance of the C.M.W.C. or its local committees are over 45 years of age. In any case all doctors of military age come up for consideration with a view to selection for service with the Forces. The C.M.W.C. would be glad to have particulars of the doctors referred to in the last part of the question as being available for professional work in reception areas.

Registration of Alien Doctors

Sir HENRY MORRIS-JONES asked the Minister in connexion with the recent regulation permitting the temporary registration of alien doctors in this country for the purpose of medical work in the war effort, how many alien doctors had so far been granted this recognition, stating the number in the category of nationality, and how many were in the services; and whether the present machinery for facilitating this registration was working satisfactorily in view of the present urgent

demand for trained medical personnel.—Mr. BROWN replied: I am informed that 18 alien doctors, all of whom are citizens of the U.S.A., have so far been registered under an order of September, 1940, which applies only to such citizens and to Canadians. I am not aware that any of this group of doctors are in the fighting services. Under a more comprehensive order of January, 1941, the cases of some hundreds of alien doctors, who are of allied nationality or refugees from enemy countries, are being investigated as speedily as possible, but none have yet been registered.

Mr. R. W. SORENSEN: Why are Spanish refugee doctors not given the same opportunity as other refugee doctors in being permitted temporarily to practise in this country; and will the Minister take steps to remedy this.—Mr. BROWN: The object of the order is to facilitate the enrolment of suitable foreign doctors in such services as the armed forces of their own countries present in the United Kingdom and the hospital service of this country. So far as I am aware these services would not benefit to any appreciable extent by addition to the list of territories specified in the order.

Exchange of Medical Officers

Mr. T. E. GROVES asked the Minister whether a scheme had been prepared for the exchange of medical officers of hospitals in bombed areas with those in less active areas; and, if so, what was the procedure.—Mr. BROWN replied: No arrangements for such exchanges have yet been found necessary, but the matter is being kept under review.

Medical Grading of Emergency Reserve Officers

Sir REGINALD BLAIR asked the Secretary of State for War if members of the Army Officers Emergency Reserve rejected on medical grounds were in all cases given information as to their medical grading; and, if not so informed in all cases, would he see that the practice was now changed.—Captain H. D. R. MARGESSON replied: It is the practice to inform all members of the Army Officers Emergency Reserve in which medical category they have been placed, except in amputation cases for which no grading exists. In the latter cases, members are told whether or not they are fit for employment.

Attendance of Recruits for Medical Examination

Mr. G. MUFF asked the Minister of Labour whether he was aware that persons had refused to attend for medical examination after proper registration for military service; and could he state the policy of the Government in such cases.—Mr. ERNEST BEVIN replied: Proceedings are taken when appropriate in order to secure attendance before a medical board. Some difficulty has arisen in certain cases where men have refused to submit to a proper medical examination and I am considering whether the law needs strengthening in this connexion.

Rehabilitation of Injured Workers

Dr. MORGAN asked the Minister of Health what steps were being taken to secure modern and adequate fracture treatment of industrial injured workers; whether the organisation of such treatment would be on the lines recommended by the B.M.A. committee and by the Delevingne interdepartmental committee in approved fracture clinics in hospitals or other centres; whether appropriate steps were being taken or intended to be taken to secure the necessary subsequent physiotherapy as well as proper rehabilitation and retraining after the stage of minimum residual disability had been reached; and whether, having regard to the need for national economy and for the provision of similar treatment in cases of injuries in other than industrial workers, he would consider, in coöperation with the other Government departments concerned, the advisability of the immediate establishment of a comprehensive national scheme for the future treatment and rehabilitation of all injured persons.—Mr. BROWN replied: In conjunction with the Minister of Labour and Secretary of State for Scotland I am considering the better organisation of facilities for the fracture treatment, rehabilitation and, where necessary, retraining of injured industrial workers, and will make a further statement as soon as possible.

Sickness Benefit for Fire-watchers

Mr. G. A. ISAACS asked the Home Secretary whether persons suffering illness caused by the carrying out of duties at their place of employment as fire-watchers from exposure to the elements or from fatigue arising from long hours without adequate rest would, as such risk was not part of the normal risk of their employment, be entitled to their wages during incapacity, or would they be covered by the provisions of the Personal Injuries (Civilian) Scheme; and what would be their position and rights under the National Health Insurance Regulations.—Mr. HERBERT MORRISON replied: I am advised that a person carrying out duties as a fire-watcher at premises which are business premises as defined in regulation 27A of the Defence (General) Regulations will be covered by the Personal Injuries (Civilians) Scheme in respect of any physical injury which is certified to have arisen out of and in the course of the performance of his duties. In respect of such an injury sickness and disablement benefits under the National Health Insurance Acts will not be payable for the first 26 weeks and will, for any period after the first 26 weeks, be subject to the adjustments laid down in section 7 of the National Health Insurance and Contributory Pensions (Emergency Provisions) Act 1939.

Advisory E.H.S. Committee

Dr. MORGAN asked the Minister of Health if he would state the constitution, personnel and functions of the Advisory Emergency Hospital Service Committee; who was responsible for its formation; when it was formed and how were its members appointed; who nominated them; and how often and where had this committee met up to date.—Mr. BROWN replied: This committee consists of representatives of the Royal Colleges of Physicians, Surgeons, and Obstetricians and Gynæcologists and also of group officers, the Central Medical War Committee, the London County Council, the staffs of London voluntary hospitals, and the medical profession in the provinces, with the secretary and deputy secretary of the C.M.W.C. Its function is to advise the Minister of Health on the organisation of medical personnel in the Emergency Medical Service. The committee was first appointed in October, 1939, and subsequently enlarged, by the C.M.W.C., and was reappointed by that committee in the present month. The members are nominated by the bodies they represent or directly appointed by the C.M.W.C., as the case may be. The committee has met on nine occasions at the offices of the C.M.W.C.

Grants to Universities

Mr. K. W. M. PICKTHORN asked the Chancellor of the Exchequer if he could now make a statement on the Treasury grant in aid of the universities and colleges during the coming financial year.—Sir KINGSLEY WOOD replied: The House will recall that, in view of the vital part played by the universities in the life of the community, the importance of maintaining as far as possible the standards of university education, and the essential contribution which the universities were making in a variety of ways towards the national effort, it was decided to maintain the provision for the current year at the same level as that in 1939—namely, £2,149,000. These considerations have lost none of their force and despite the increasing strain on the national finances, the Government, after considering a report from the University Grants Committee, have reached the conclusion that if the universities are to continue their present contribution to the national effort, the provision for 1941 must be maintained at the existing level. They earnestly hope that local authorities will take similar action.

Blood Donors

In reply to a question Miss F. HORSBRUGH said that there was no general shortage of blood donors, but that in certain areas more were needed. Local campaigns were being organised in those areas.

Distribution of Unrationed Commodities

Mr. DAVID ADAMS asked the Chancellor of the Exchequer whether, in view of the urgent necessity of preventing both inflation and malnutrition, he was coöperating with the Minister of Food in devising a scheme whereby a minimum supply of essential foodstuffs should be guaranteed to each household in the country.—Sir KINGSLEY WOOD replied: The Ministry of Food is giving consideration to a general scheme for improving the distribution of unrationed commodities. In the course of these considerations the Treasury among other departments concerned has been consulted and is giving the fullest possible coöperation in trying to solve the problem.

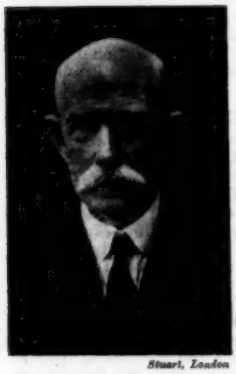
The New Zealand minister of health has announced that the free general-practitioner service, provided for in the Social Security Act, will come into force today (Saturday).

Obituary

JOHN McFADYEAN

KT., M.B., B.SC. EDIN., LL.D. ABERD., F.R.C.V.S.

Sir John McFadyean, who died on Feb. 1 at the age of 87, did more than other any man in the past hundred years to put veterinary science on a sound footing, and it is largely due to his efforts that the standard of veterinary training has been raised from a two-year course to a five-year course with the same conditions of entry as are demanded by a university.



Stuart, London

Born and brought up on his father's farm in Wigtownshire, he had the best possible upbringing for a veterinary career, and the knowledge he then gained of the practical management of livestock and the land provided the background on which he based his essentially sound conclusions on a wide range of subjects. After leaving the Ewart Institute at which he was educated, owing to the uncertainty of the outlook for agriculture he decided to adopt the veterinary profession. He studied at the Edinburgh Veterinary College—now the Royal (Dick) Veterinary College—and was admitted a member of the Royal College of Veterinary Surgeons in 1876. Shortly after graduation he joined the teaching staff of the Edinburgh College as lecturer in anatomy.

His dissatisfaction with the existing standards of teaching led him to study human medicine at Edinburgh University, where he graduated M.B. in 1882, taking his B.Sc. in the following year. For a short time he carried on medical practice in addition to his teaching duties, but he did not find it congenial and determined to devote himself solely to his duties at the college. He was always much drawn to the subjects of bacteriology and pathology, and in 1892 he accepted an appointment to teach these subjects at the Royal Veterinary College in London, later becoming the first holder of the professorship of comparative pathology there. In 1894 he became principal of the college, and he held this appointment until his retirement in 1927. He set a high scientific standard in all his work and his students will remember the clarity with which the principles of bacteriology and pathology were placed before them, and the meticulous care with which all bacteriological and post-mortem examinations were carried out.

In 1888, while still in Edinburgh, he had undertaken the publication of the *Journal of Comparative Pathology and Therapeutics*, whose acceptance of an article soon came to be regarded as the hall-mark of scientific accuracy. Possessed of keen analytical powers, his criticisms were at times devastating, but on more than one occasion they were found to be of the greatest value in enabling scientific bodies to arrive at sound conclusions on matters of importance.

Like many other workers fully occupied in research, teaching, and administration, McFadyean found little time for writing. His one textbook, "The Anatomy of the Horse," has become the standard dissection guide for students and he also completed the first part on osteology of a projected work on the comparative anatomy of the domesticated animals.

His contribution to veterinary anatomy was notable, but it is exceeded by his work on bacteriology, pathology and the control of contagious disease. In his evidence before the Royal Commission on Tuberculosis, he insisted that measures for the control of bovine tuberculosis were essential for the protection of the human race, and later he played a prominent part in bringing about legislative and administrative measures for the proper inspection of milk and meat. For these services the Royal College of Physicians in 1933 awarded him the Weber-Parkes prize and medal. His work on glanders and mallein enabled that disease to be stamped out of this country and brought under control in all the more progressive countries of the world. Indeed, he was a pioneer in the great development of comparative pathology which has taken place since the middle of the past century.

His students will always remember John McFadyean as a great personality, distinguished of aspect and rather terrifying to the shy, but blessed with a keen sense of humour and a natural kindness which, despite the strict discipline he maintained, won him affection and respect as a teacher and a scientist.

In 1883 he married Mara Eleanor, daughter of Thomas Walley, principal of the Royal (Dick) Veterinary College, Edinburgh. She died in 1929, and they leave three sons and two daughters.

SIR WILLIAM HORROCKS

THE death of William Heaton Horrocks recalls to many of his friends first of all the story of undulant fever so surely stamped out in Malta by his work. The A.M.D. report of 1861 contains a treatise on the fevers in Malta by assistant surgeon J. A. Marston, M.D., of the Royal Artillery, in which he described a type of "Mediterranean remittent," or "gastric remittent" fever, to be carefully distinguished from typhoid. In 1887 Surgeon-Major D. Bruce, A.M.S., discovered the causative organism of the disease, isolating it from six consecutive cases and giving it the name *Micrococcus melitensis*. Ten years later, Captain M. Louis Hughes (killed in 1899, when serving on General Buller's staff in South Africa), in his book "Mediterranean, Malta or Undulant Fever," gave a clear account of the symptoms and signs of the disease confirming Bruce's discovery of the causative organism. In 1903 when Major Horrocks was transferred to the Royal Society commission, the germ had then been recognised for sixteen years; every possible measure that could be thought of had been taken to get rid of it; and yet the disease continued to take its toll of life and health unabated. The commission, working under Bruce himself, investigated every means by which the germ might be spread from man to man. Its members (Horrocks, Crawford Kennedy, I. Zammit, E. A. Shaw, and others detailed for duty from time to time) showed how the micrococcus escaped from the human body; showed too that though it could be transferred, though very rarely, to the monkey by the bites of infected mosquitoes, ecto-parasitis probably played but a small part in its transmission; that monkeys were easily infected, either by feeding or inoculation. And then, suddenly, Horrocks and Zammit reported real progress. They started to examine the Maltese goat, proved that it was easily infected by feeding, and with the help of Captain Kennedy that about 41% of these animals agglutinated the germ; that approximately 10% passed it in their milk, and that these very creatures were supplying the hospitals as well as the rest of the garrison! We can recall a diagram shown to the promotion class by the late Sir William Leishman, setting out the incidence of undulant fever contracted before and immediately after the stoppage of goats' milk to the garrison of Malta. It was one of the most striking examples that could be conceived of the elimination of an infection.

This was, perhaps, the most valuable piece of work done by Horrocks in preventive medicine, but there were many other points on which he threw much light and many problems which he helped to solve. While assistant professor of hygiene he published his "Introduction to the Bacteriological Examination of Water," for long a standard work on this subject. Later he published papers on varieties of intercepting traps for domestic sewage and studies on the liberation of germs from the bursting of bubbles and from other sources in drains. He demonstrated the passage of anthrax bacilli into the milk of a cow suffering from the disease and demonstrated the presence of bacilli in the milk of a female goat artificially infected. He also called attention to the agglutination test as a means of diagnosis between *Bact. typhosum* and the coliform organisms. With Colonel Firth he edited Parkes's "Theory and Practice of Hygiene," and the second edition of "Notter and Firth." For many years Horrocks was a member of the Army Medical Advisory Board, chairman of the Army Hygiene Committee, and chairman of the Anti-gas

Committee. As chief sanitary adviser to the Army he was responsible for designing the "Horrocks box"—a valuable contrivance for the testing and chlorine sterilization of water. As chairman of the anti-gas committee he played an important rôle in the elaboration of measures for the defence of our troops against noxious gases. He was editor of the R.A.M.C. *Journal* for thirty-two years, and will be grievously missed in this capacity as well as in many others by officers of his old corps.

Horrocks was educated at Owens College, Manchester. He graduated in London later, taking his M.A. in 1883. For a time he was a resident at the Brompton Hospital, and then transferred to the Guildford Hospital. While there a chance conversation with a patient made him think of the Army, and he joined the Army Medical Service, "a step," says his daughter, "which he never once regretted." He married while in India, in 1895, Minna, daughter of the Rev. J. C. Moore, of Connor, co. Antrim, with whom he led a life of unclouded happiness until her death in 1921. Of the two children of the marriage, one, Brigadier B. G. Horrocks, is at present commanding an infantry brigade. His daughter was his faithful companion until his death. S. L. C.

PROF. K. F. WENCKEBACH

Sir Arthur Keith who formed an intimate friendship with Professor Wenckebach in the opening years of this century writes: Although it was as a cardiologist that Karl Wenckebach became known in the world of medicine, he is still quoted by embryologists for a research on the development of certain fish carried out when a student at Utrecht, and after he had settled to country practice in the Limburg province of Holland he came back from time to time to explain to his old professor of physiology that the irregularities of the heart observed by the professor in experimental frogs were also to be found among his patients. Hence it came about that while James Mackenzie in Burnley approached the problems of the heart through the jugular pulse, Wenckebach, who was called to the chair of medicine at Groningen in 1901, studied them through the arterial pulse.

From his youth Wenckebach was drawn towards our literature and our British ways of life; he was quick to perceive that the physician in Burnley represented a new power in British medicine, and a close and intimate friendship sprang up between them. Both were big men—big in body, in mind and in the intensity of their interests and feelings. Both had deep and burning convictions—not only concerning the misdemeanours of the heart but concerning disease in all its manifestations. Mackenzie had much of the fighting Scottish convenanter in him, Wenckebach had grown up in touch with the best musical, literary and art circles of the Hague; several of his relatives had made their reputation as artists, his eldest son has become a well-known sculptor. Both men—Mackenzie was Wenckebach's senior by nearly ten years—having active brains and strong tempers as well as warm hearts had reason to complain of each other from time to time, but their correspondence and friendship were never interrupted for long.

Soon after I got to know Wenckebach I was investigating the relationship of visceroptosis to respiration. I found he was making a similar investigation and was invited by him to Groningen to see cases in which the viscera had descended so far that the diaphragm no longer could cause descent of the abdominal viscera. After days of demonstration he carried me to the coast at Harlingen, where the great professor entered into all the "fun of the fair" like a schoolboy on holiday. He was an intensely lovable man—yet proud—a quality which helped to shape his strange career. In 1910 the chair of medicine in Amsterdam was vacant and he was invited to fill it. He informed the authorities that he would accept only if the department was reformed and re-equipped. The authorities countered by appointing another and Wenckebach retaliated by accepting in 1911 an invitation from Germany to fill the chair of medicine in Strassburg. In 1914, when war broke out, he was on his way to fill the chair of medicine in Vienna, His heart in these wanderings remained true to Holland. It was characteristic that on resigning his chair in 1929 when he reached 65, the age he held to be the limit of effective service in a professor, he stated that he was still uncertain as to the most effective method of teaching his subject, but he was convinced that "intellectual contagion" was a first essential.

Wenckebach was representative of that wonderful breed of men to be found in the Netherlands which has the gift of tongues as well as of intellect. Few men born and bred in foreign countries can break through our British barrier and make us feel they are fellow countrymen. Wenckebach could do this and make us laugh, too, for he had a keen sense of humour. We of English-speaking countries will miss him for many a year, for he was a most effective link between the English world of medicine and that which lies outside it.

GEORGE HENRY MASSON

O.B.E., M.D., D.SC. EDIN., F.R.C.P.E.

Dr. G. H. Masson, medical officer of health for Port-of-Spain, who died recently, had done much to improve the public health of the West Indies. He qualified at the University of Edinburgh in 1895, and, as befitted a student of Sir Robert Philip, as tuberculosis officer he early established a dispensary scheme in Port-of-Spain which was in advance of some English ones of that time. To practical experience he added academic distinction, taking his M.D. in 1897 and his D.Sc. in public health in 1907. He was elected to the fellowship of the Royal College of Physicians of Edinburgh and the Royal Society of Edinburgh. He studied in Paris, Berlin and Vienna and had the gift of tongues. But he wore his learning modestly and won affection as well as respect from his colleagues. On the next page our account of Dr. Marcano's report of the health of Port-of-Spain in 1939 suggests that the problems Masson faced in his work differed from our own only in degree.

CHARLES WILLIAM CHAPMAN

M.D. DURH., M.R.C.P.

Dr. C. W. Chapman, who died on Jan. 31, was born in London in 1843. He qualified from Guy's Hospital in 1868 and, after being physician to the Farringdon General Dispensary in 1892 he joined the staff of the National Hospital for Diseases of the Heart. Here he gave all his thought and energy in arousing the hospital from the lethargy into which it had sunk since its foundation in 1857. The Adam house in Soho Square was no longer suitable for a hospital and in 1912 the hospital was rebuilt on the site of Dr. Haweis's chapel in Westmoreland Street, where it stands today. Chapman was active in the selection of the site and the supervision of the building. Soon after the last war he retired from the staff of the hospital, but he continued his private practice for some years and retained to the end the confidence of his patients. He was always greatly interested in children and wrote a book on Heart Disease in Childhood and Youth. At the age of 83 he also wrote a small handbook for students on The Heart and its Diseases, and for several years he contributed annual reviews of the literature of cardiology to the *Practitioner*.

WESTMINSTER PAST AND PRESENT.—The Editor of *The Broad Way*, the journal of Westminster Hospital, writes to say that four etchings of the hospital in 1734, 1834, 1934, and 1939 will appear as a free supplement in his next four issues. The artist is one of the present students and the etchings are suitable for mounting and framing. The first issue of *The Broad Way* containing one of these etchings will be published soon, and if any Westminster man would like to make certain of getting a complete set he should communicate with the editor.

Public Health

From the Annual Reports

PORT-OF-SPAIN, TRINIDAD

For purposes of comparison with the health conditions of Britain, Dr. Roderick Marcano's report of Port-of-Spain for 1939 may be taken as giving a typical picture of the health conditions in a tropical colony. In 1921 the population of the city was 61,396 and the density 34·2 per acre. In 1939 the population was 90,375 and density 35·6. Overcrowding, the curse of all cities, is greater in the tropics than it is here and its tendency has been to become worse. Little progress was made in re-housing until quite recently, but in 1939 Port-of-Spain made some progress in this direction. The population is pure "British"—that is, it is made up of all races under the sun and every conceivable combination thereof. The various races which are subject to the Crown gain British citizenship but to a large extent retain their national habits and ancient metaphysics. The political significance of this is enormous, but from the public-health point of view it causes great difficulties. Feeding is the most important single problem confronting the health officer. In Britain, where we all eat much the same foods and have much the same feeding habits, the food problem is difficult enough, but in the mixed communities of the Empire it is much more complicated. Meteorological conditions in the Empire vary between all extremes of which the earth is capable, but though these influence health problems their influence is far less than was formally supposed; the general healthiness of a population is little affected by them directly, and all deleterious climatic influences are capable of suppression. West Africa—the White Man's Grave of our fathers—is now as healthy for Europeans as Manchester is. Strictly speaking there are no tropical diseases, but some diseases are localised because they are spread by living vectors which may have a local distribution. Thus, sleeping sickness is limited to parts of Africa because it can be spread only by certain flies which have a limited distribution. In Trinidad there are no diseases which might not occur in this country, but some, such as malaria, ankylostoma and a form of dengue, which here are curiosities, are there important. But their influence on the health of the people is comparatively slight. Of the 1503 deaths in Port-of-Spain in 1939, the number of those which would not appear on our list were 38 malaria, and 4 ankylostomiasis. The only one of our diseases which does not appear on their list is scarlet fever, which for some unexplained reason is not seen, except as a curiosity, in any tropical country. The vital statistics for Port-of-Spain for 1921 and 1939 differ little from those of English towns for 1891 and 1909, in fact, the health conditions of most tropical colonies are similar to those of England a generation ago, their trend is similar and their problems are similar. Except that in temperate climates we do not now have to bother much over mosquito-spread diseases, or such food diseases as beriberi or endemic dropsy, health problems are identical in all parts of the world. Tuberculosis, syphilis, respiratory infections and the diarrhœal diseases are the main enemies of human health and their problems are similar in kind everywhere. We have taken Port-of-Spain, but had we taken Singapore on the other side of the earth, we should have been able to bring out much the same points.

OLDHAM

The vital statistics of Oldham, like those of its sister towns, reflect the depression in the cotton county boroughs of the inter-war period. The population reached its highest point of 148,300 in 1921, since when it steadily declined to 123,400 in 1939. Coincidentally, the birth-rate fell from 21·3 to 12·4 in 1933, rose to 13·3 in 1938 and fell again to 12·5 in 1939. The crude death-rate increased from an average of 16·4 in 1919–1928 to 17·4 in 1929–1938 and in 1939 rose further to 18·6. Corrected for transferable deaths, this shrinks to 15·7, but as the comparability factor is 1·12, the true death-rate was 17·6 compared with the rate of 12·1 for England and Wales. These statistics might be those of a population losing by emigration of young adults, but the comparability factor being above unity tells us that this is not so and that the loss is mainly due to loss in fertility. The infantile mortality was 60, the lowest recorded in Oldham, but maternal mortality was 7·9, which is exceptionally high. Dr. J. T. Chalmers Keddie's comprehensive report contains a chapter on Oldham Council for Mental Health, a voluntary association affiliated to the National Council for Mental Welfare, which is of great interest, for Oldham council is a pioneer of a movement which was beginning at the end of the inter-war era. Mental health was outside the province of hygiene until quite recently and when it was taken in it was found to have three formidable difficulties—it is entirely personal; its work must be secret; and its prosecution requires much which practitioners of medicine are not in a position to deliver. Its progress must therefore be slow, but Oldham has made a successful start and what is being done there is helpful.

Infectious Disease in England and Wales

WEEK ENDED FEB. 15

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1198; whooping-cough, 3425; diphtheria, 1175; enteric fever, 18; measles (excluding rubella), 16,654; pneumonia (primary or influenzal), 2106; puerperal pyrexia, 200; cerebrospinal fever, 378; poliomyelitis, 12; polio-encephalitis, 2; encephalitis lethargica, 6; dysentery, 174; ophthalmia neonatorum, 62. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Feb. 14 was 2086, including: scarlet fever, 285; diphtheria, 322; measles, 728; whooping-cough, 190; enteritis, 23; chicken-pox, 196; erysipelas, 58; mumps, 10; poliomyelitis, 2; dysentery, 8; cerebrospinal fever, 75; puerperal sepsis, 8; enteric fevers, 4; german measles, 2; other diseases (non-infectious), 82; not yet diagnosed, 93.

Deaths.—In 126 great towns there was no death from smallpox, 2 (0) from enteric fever, 3 (0) from scarlet fever, 38 (3) from whooping-cough, 26 (5) from measles, 46 (1) from diphtheria, 36 (1) from diarrhœa and enteritis under 2 years, and 324 (50) from influenza. The figures in parentheses are those for London itself.

Liverpool and Yarmouth each reported one fatal case of enteric fever. Liverpool had 6 deaths from diphtheria and Birmingham 5. Birmingham also had 5 fatal cases of whooping-cough. Deaths from influenza were scattered over ninety-three great towns, Liverpool reporting 13, Blackpool 10, Newcastle-on-Tyne, and Bristol each 9.

The number of stillbirths notified during the week was 213 (corresponding to a rate of 38 per thousand total births), including 21 in London.

INCIDENCE OF INFLUENZA

In the week ended Feb. 15 324 deaths were ascribed to influenza in the great towns—Feb. 8, 261 (56); Feb. 1, 176 (45); Jan. 25, 120 (22); Jan. 18, 99 (17); Jan. 11, 69 (9); Jan. 4, 53 (8). The ratio of increase is thus appreciably less than between the two previous weeks. The age-distribution of the deaths continues to be normal. In the County of London, the deaths decreased from 56 to 50. Hospital admissions in London for influenza, bronchitis and pneumonia decreased from 811 to 526 and the daily records of the current week show no sign of increase.

BRITISH DRUG HOUSES Ltd. have put on the market a jelly containing 2% gentian violet and 0·02% sodium ethyl mercuri-thiosalicylate which they recommend for the treatment of second-degree and third-degree burns, particularly of the hands, feet and face. Clinical trial suggests that 2% rather than the 1% gentian violet hitherto in common use may be the optimal concentration for burns. Gentian Violet Jelly B.D.H. is available in 1½ oz. and 4 oz. tubes.

Appointments

BILLIMORIA, B. R., F.R.C.S.: R.S.O. at Frimley Sanatorium.
CRICHTON, J. P.: L.R.C.P.E., L.D.S., D.P.H.: temp. asst. M.O.H. for Stepney.
MEADE, CAROLINE, M.B. Lond., D.P.H.: temp. asst. M.O.H. for Stepney.
SAMBROOK, D. K., M.B. Lond.: asst. M.O. at the County Council Hospital and hutments annexe, Hereford.

Medical News

University of Oxford

The Rockefeller Foundation have given the university 5000 dollars for the purchase of equipment and research supplies and the provision of the salaries of assistants for Prof. H. W. Florey in connexion with researches in general biochemistry at the Sir William Dunn school of pathology. They have also made a similar grant of £1000 in connexion with research on the X-ray analysis of biologically important large molecules by Mrs. D. M. Hodgkin in the department of mineralogy and crystallography.

University of Cambridge

At recent examinations the following were successful:—

D.M.R.E.

Part I: Manfred Altmann, R. D. Caton, Arthur Elkeles, J. E. Glasgow, Grace M. Griffith, Max Halberstaedter, and P. C. Phelps.

Royal College of Obstetricians and Gynæcologists

The following have been elected to the fellowship of the college:—

W. C. Armstrong, Glasgow; N. L. Edwards, Derby; A. L. Guan, London; Joan K. Rose, Edinburgh; W. A. Taylor, Birmingham; and Robert Watson, Northampton.

The DENTISTS REGISTER for 1941 just issued contains 15,032 names, or 22 more than last year. But the total of new names (388) is less by 50 than in the previous year.

At the section of surgery of the Royal Society of Medicine, on Wednesday, March 5, at 2.30 P.M., Mr. Julian Taylor and Mr. R. Watson-Jones will open a discussion on war injuries of the spine, and on March 7 at the section of otology at 10.30 A.M. Miss D. J. Collier, Dr. F. S. Cooksey, and Mr. Terence Cawthorne will open a discussion on the limitations of operative treatment in facial palsy. On the same day at 4.30 P.M. at the section of laryngology Mr. E. D. D. Davis will read a paper on chronic hyperplasia or focal osteitis of the maxilla.

At the quarterly meeting of the directors of the Naval Medical Compassionate Fund, held on Feb. 21 with Surgeon Vice-Admiral Sir Percival Nicholls in the chair, the sum of £96 10*s.* was distributed among the applicants.

On Friday, March 7, at 1.45 P.M., Major-General H. Willans, director-general of army welfare, will read a paper on that subject to the Royal Society of Arts. The meeting will be held at the house of the society in John Adam Street, London, W.C.2.

Today, Friday, Feb. 28, at 4 P.M. at the University of Edinburgh Sir Joseph Barcroft, F.R.S., will deliver the Sharpey Schafer lecture. He will speak on four phases of birth.

In a recent casualty list Lieutenant J. Cunningham, M.B., R.A.M.C., is reported to have died.

Messrs. May and Baker have given a million tablets of M. & B. 693 to the Lord Mayor's Greek relief fund.

Births, Marriages and Deaths

BIRTHS

REAVELL.—On Feb. 18, at Gloucester, to the wife of Dr. Denys Reavell—a daughter.

SHACKLETON BAILEY.—On Feb. 22, at Eye, Suffolk, the wife of Dr. J. Shackleton Bailey—a son.

MARRIAGES

BURNFORD—EVERY.—On Feb. 22, at Uddingston, David Wreyford Burnford, M.R.C.S., surgeon lieutenant R.N.V.R., elder son of Dr. Julius Burnford, to Sheila Philip Every.

CRAN—LEBURN.—On Feb. 19, at Gateside, Ian Rose Cran, M.R.C.S., only son of Dr. Hugh Cran, to Joy Leburn.

TURNER—MEULEN.—On Jan. 4, at Christchurch, Purley, Richard W. D. Turner, M.D., M.R.C.P., lieut.-colonel R.A.M.C., to Paula Meulen.

WILLATT—EVERSHED.—On Feb. 18, Ian Duncan Willatt, M.B., to Ruth Annette Janie Evershed, M.B.

DEATHS

BARKER.—On Feb. 21, Ernest Marriott Barker, M.B. Camb., of White Rock Road, Hastings.

BEADLES.—On Feb. 23, at Romford, Harold Shatford Beadles, M.R.C.S.

CREWDSON THOMAS.—On Feb. 19, at Bracknell, George Crewdson Thomas, M.D. Edin., M.R.C.P.E., of Chester Square, S.W.1.

HASSARD.—On Feb. 20, at Hindhead, Edward Moresby Hassard, Commander of the Order of Avis, M.R.C.S., colonel R.A.M.C. (retd.).

JOHNSON.—On Feb. 4, Lieut.-Colonel Reginald Johnson, M.B.E., M.D. Dubl., lieut.-colonel R.A.M.C.

PROBYN.—In February, by enemy action, Lesley Maude Campbell Probyn, M.R.C.S.

WHITING.—On Feb. 9, at Torquay, Arthur John Whiting, M.D. Edin., M.R.C.P., aged 75.

Notes, Comments and Abstracts

TREATMENT OF CHILBLAINS

BY G. I. WATSON, M.D. Camb., D.T.M. & H.
LIEUTENANT R.A.M.C.

PEOPLE who suffer from chilblains can be divided into two groups: those who believe in calcium and those who do not. The first of the following case-histories is that of a young woman who does not. An observation of hers led me to use a treatment which has given her and others almost immediate relief from their chilblains.

CASE 1.—A woman, aged 23, whose work includes driving and cleaning a motor-car, but is varied both indoors and out. Two sisters suffer severely from chilblains; her mother and father have chilblains occasionally. She has suffered in summer from urticaria, and blisters easily in direct sunshine. She cannot remember a winter in which she has not had severe chilblains on both hands and on one or both feet. She has been treated with calcium in large doses, both by mouth and by injection, together with vitamin D in various forms; but she has not been freed of chilblains even temporarily by such treatment. One winter recently her chilblains were abolished when she stung her hand in some nettles. She cannot recall whether the effect was only on the one hand or on all her chilblains.

It is possible that H-substance, which is closely allied to histamine, is produced at the site of a sting, whether by nettles or bees. I was using histamine experimentally for other purposes at the time, and was familiar with its local effects after subcutaneous injection. I offered, with her active coöperation, to inject one of her chilblains and to watch the result.

On Nov. 21, 1939, she was given a test dose of histamine (B.D.H.), 0·5 c.cm., subcutaneously in the forearm; she developed a large weal with irritation round it, facial flush and frontal headache; no itching of chilblains. On the 24th she was given 0·1 c.cm. of histamine, split into two doses, into a chilblain on the 3rd finger of her left hand; there was immediate itching, but that night all itching in this chilblain ceased. Next day I obtained the same result with a chilblain on her right hand, and by Dec. 12, after several further injections, both hands, though scaly, were free of chilblains. Treatment of the right foot was begun on Dec. 2 and a second injection was given on Dec. 12. By Dec. 15 new chilblains had developed on her hands. She began using bee-toxin ointment (A. and H.) first on her hands, and later on her feet, alternated with injections of histamine. At first the ointment produced itchiness without subsequent relief, but after three or four days the itching ceased and the skin became scaly as after injection. Results seemed to be better if the ointment was applied after bathing in hot water, especially soft water. The last injection of histamine was given on Jan. 19, and on Feb. 2 the calcium was stopped. By Feb. 9 she only experienced slight pricking in the hands and her feet were quite comfortable. She continued to use the ointment locally.

While these experiments were proceeding, two other patients presented themselves.

CASE 2.—Male, 29, motor driver, suffering from moderately severe chilblains on both feet. On Dec. 30, 1939, histamine, 0·3 c.cm. split into five doses, was injected into or near many scattered chilblains on both feet. Immediate itching in all affected chilblains, not severe. On Jan. 5, 1940, he reported that his chilblains had itched for about half an hour and thereafter had been completely comfortable.

CASE 3.—A woman of 27 who often suffered from severe chilblains, especially on her feet. On Jan. 2, 1940, began taking calcium lactate tablets gr. 15 t.d.s. On Jan. 18 she was not much better. Histamine, 0·35 c.cm. split into seven doses, was injected into or near the chilblains of both feet. Feet cold; no immediate itching. On the 20th she reported that itching had begun within a quarter of an hour of injection and had continued for about two hours. Thereafter she had been free of any discomfort in either foot. On Feb. 15 she reported that her feet had remained comfortable.

After these tests with injections of histamine, I wanted to find a way of getting histamine into the skin without injecting it. While I considered making a histamine ointment, or one which would liberate histamine in the skin, Dr. Max Davison suggested the use of bee-venom ointment as an alternative. Such an ointment was used

in case 1, as I have mentioned, and the effect appeared valuable. It was later used in three other cases.

CASE 4.—A woman of 55 whose feet always felt cold. She suffered during most winters from chilblains on her toes. On Feb. 5, 1940, she began putting both her feet into hot water at night; then she rubbed the left foot (the worse side) with bee-toxin ointment and the right with Vaseline. By Feb. 10 the chilblains had disappeared from the left foot, which was comfortable; but those on the right foot remained itchy. She reported that the chilblains of the left foot had felt warm for two or three nights after she began rubbing them with bee-toxin ointment. But after the first few days no local itchiness or warmth was felt when the ointment was used. On Feb. 12 she began using bee-toxin ointment on the right foot. On the 20th she reported that the chilblains of the right foot had become comfortable but not quite so quickly as those of the left. Neither foot now itched when it got warm at night.

CASE 5.—A man of 30 complained that this year for the first time he had chilblains on the lobes of both ears, worse on the right ear. He drives a car nearly all day, and the wind blows past the side of his head. On Feb. 10–11 he used bee-toxin ointment for two consecutive nights on the chilblains of his right ear, and reported them comfortable while those on his untreated left ear remained itchy. Local warmth was felt for about half an hour after using the ointment. On Feb. 15 he treated the chilblains on his left ear with ointment one night and on the following morning they were better.

CASE 6.—A woman of 25 had chilblains on each index finger during the cold weather of this winter. She has chilblains only occasionally. On Feb. 8 she began rubbing bee-toxin ointment on the chilblains of the right index finger (the worse side) after washing her hands at night. On the 9th she reported slight local itching and no improvement. On the 11th the chilblains of the right index finger had ceased to itch while those on the left finger were unchanged. In subsequent warmer weather these experiments came to an end.

DISCUSSION

A small subcutaneous injection of histamine into or near a chilblain will cause the lesion to itch acutely for a short time. After this itching ceases, the chilblain will remain comfortable for some days in hot or cold atmospheres. Changes in the colour and texture of the skin are observed and the chilblain may disappear completely, but other chilblains can develop close to the injected one. This effect does not depend on the taking of extra calcium, since only one patient (case 1) out of three so treated was taking calcium. The action of calcium may be complementary to the action of histamine, because it has a direct action on capillary tone, and because it antagonises the enzyme histaminase, which destroys histamine.

An ointment such as bee-toxin ointment applied daily to a chilblain has the same ultimate effect as an injection of histamine. The effect of bee-toxin is slower and more prolonged and therefore can be used to prevent as well as to cure chilblains. After its use the skin over the chilblain may scale for some days, but without causing discomfort. The injection treatment has an advantage, if rapid temporary relief from severe chilblains is required. Bee-toxin ointment, however, being simple to apply will in general be more useful.

THE FOSTER-CHILD'S LOT

A BLIND-SPOT in our legislation exposes the foster-child to physical and emotional experiences which other children escape. Dr. G. F. Buchan[1] gives examples of children bandied from home to home, sometimes four times in a fortnight, because their mothers failed to make payment regularly. Others, gravely ill, have lacked the care of a doctor because the foster-parents, already out of pocket, have been unwilling to spend more money which they had no hope of recovering.

The law relating to child protection places obligations on the foster-mother to notify when she receives a child or lets him leave her care, but requires nothing of the mother. If a child is returned to his mother the welfare authority has no further responsibility, even though the mother is unsuitable, or unable to take the child in. She can pass him on to anyone she likes, without notifying the authorities; yet if the child in foster care dies or the foster-parents change their address the law does not require that the mother be informed. Thus in one sense she is treated as the only guardian of the child who needs no supervision, and in another sense is ignored as though she had no responsibility for him at all. Though the usual reason for a change of foster home is failure in payment, some children are so difficult, ill or unattractive that no foster-mother will keep them; sometimes, too, the real mother makes the foster-mother's house a home from home, spending all her free time there and expecting to be given meals. The fees paid for these children are small, ranging in Willesden from 5*s.* to £1 a week, but seldom exceeding 12*s.* 6*d.*; this leaves no margin for hospitality to the mother.

Most of the children are illegitimate. The mother may work up to within a month of confinement; during the last month she must keep herself and make provision for the child. At the end of ten days or a fortnight in hospital she is discharged, usually having nowhere to go and needing to get work at once. She does not know how to set about finding a foster-parent; usually she persuades someone to take the child on a promise of payment out of her first earnings. If she cannot find work immediately the foster-mother brings the child back to her. Dr. Buchan recounts the story of a woman who applied at the municipal health centre for the names of foster-mothers. Her child was three weeks old. She had left it with a foster-parent and sought work; two days before she was due to start in a post the foster-mother brought the child back. She owed a week's rent for her room, and had no money to buy food for herself or the child. She was sent to the relieving officer who was able to arrange things for her, though somewhat late in the day.

The difficulties of the foster-parent are almost as serious as those of the mother. If payment fails she can return the child to the mother, get the public assistance department to take him, or keep him for nothing. The mother has often disappeared, and the public assistance authorities will only accept responsibility if the fullest inquiries have been made for her. Meanwhile the foster-mother must go on feeding and clothing the child as best she can. Quite often she decides to keep the child for nothing and bring him up as her own; some foster-parents legally adopt children left with them, and from the child's point of view this is probably the best thing that could happen; it is proof at all events that he is welcome, and it gives him security. Children who are less attractive fare worse; often they have no clothes except those spared by a succession of foster-mothers, and they may lead completely uncertain lives until the public assistance authorities place them in an institution. Dr. Buchan tells of one child found dead in bed after a fall into a bath; although he had seemed very ill the foster-mother had only got as far as deciding to call the doctor in the morning if he wasn't better.

The defects in the law could be remedied, Dr. Buchan thinks, if welfare authorities were given better control over foster-parents, mothers, and the children themselves; and if payment was made directly to the foster-parents by the authorities, who would then be responsible for recovering it from the parents. The mothers, he suggests, should be required to apply to the authority when they wished to place the child in foster care; and the authority should provide some kind of home or clearing-house where children could be placed on coming out of hospital, or in other emergencies. Finally he lays emphasis on the need for pensions for mothers: family allowances which will include the illegitimate no less than the legitimate child.

1. *Med. Offr*, Jan. 25, 1941, p. 29.

PHILIPS METALIX (London) have put on the market their Photalix shockproof diagnostic tube which they claim has all the advantages of oil insulation without the drawbacks associated with an oil-immersed tube. It weighs 15½ lb. and is adaptable to any tube-stand. It can be supplied with vertical or horizontal cable inlets.

SILVER NITRATE STICKS.—Owing to difficulty in obtaining the wooden holders for their caustic points Messrs. Johnson and Sons of Hendon have designed a neat bakelite holder with a screw cap which should be equally satisfactory.